REVISION OF AUSTRALIAN SYRPHIDAE (DIPTERA). Part i.

By E. W. Ferguson, M.B., Ch.M., D.P.H.

(Plate xiv.)

[Read 26th May, 1926.]

Introduction.—The Syrphidae form a well defined group of Diptera which are distributed throughout the world. While, however, the family has been intensively studied in other faunal regions, as for example in Great Britain by Verrall, in America by Williston, in India by Brunetti and in the Malayo-Papuan region by de Meijere, little attempt has been made to deal systematically with the Australian species. The general impression has been that the Australian fauna is relatively poor in species as compared with other faunal regions, and this is probably in the main correct, though, as will be shown in the present review, the number of described species falls far short of the number occurring here.

The species already described are scattered through the works of Wiedemann, Macquart, Walker, Thompson, de Meijere, Bergroth, Klocker, Hardy and others.

Hardy (1921) made the first attempt at a critical revision of the previously described species, but his work was only partial, covering only the subfamilies Eristalinae, Cerioidinae, Microdontinae, Chrysotoxinae and Milesiinae. The extensive subfamily Syrphinae—the most abundantly represented—was not considered.

This work, partial as it is, has been of the greatest assistance to the writer of the present paper.

Klocker (1923) dealt with a small collection forwarded by the Queensland Museum and his material is entirely from that State. Curran and Bryan (1926) have recently contributed a short paper on material in the Bernice Bishop Museum, Honolulu. The present revision is rendered necessary by the chaotic state of the family, particularly in regard to the older described species of the subfamily Syrphinae and by the need of describing the many unnamed species that exist in all collections of Diptera. The revision follows more ambitious lines than has hitherto been attempted on the Australian members of the group, and it is the intention, not only to describe new species, but to review critically every species described or recorded from Australia.

The work has been considerably facilitated by a study of the writings of authors in other faunal regions, particularly those of Brunetti and de Meijere. A study of these was all the more necessary in that many species that are widespread in the Oriental region occur also in the tropical parts of Australia, in at least one instance as far south as Sydney.

Care has also to be taken to guard against describing as new, species which may have been introduced from Europe.

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Family Syrphidae.

Head about as wide as thorax. Eyes ranging from bare to pubescent, sometimes in one sex only; facets in ♂ sometimes larger in front; generally contiguous or closely approximate in ♂, rarely wide apart (*Microdon*), always wide apart in ♀, always wider apart in ♀ than in ♂. Frons flush with eyes, moderately or strikingly prominent. Face variable, in the more usual form distinctly projecting beyond eyes in profile, usually distinctly cut away immediately below antennae, then produced into a central bump of varying size and shape, then retreating again and finally produced over upper border of mouth. Excavation below central bump often absent; the whole face sometimes conically and conspicuously projected forwards or diagonally downwards (*Graptomyza*). In some genera the face descends almost perpendicularly from below antennae (*Cerioides*); in others it forms a uniform convexity (*Microdon*). Antennae generally situated above middle of head in profile; normally comparatively short, drooping; in some genera the whole antenna is conspicuously elongate; arista dorsal, subbasal, bare to plumose; terminal style sometimes present (*Cerioides*). Proboscis short or moderately long, in rare instances extremely elongate (not in Australian forms); palpi one-jointed, slender, rarely conspicuous. Three ocelli present. Thorax quadrate, oblong, oval or sometimes transverse; moderately arched; generally with soft pubescence, occasionally with bristly hairs about lateral margins or corners. Scutellum moderately large, semicircular, rarely dentate at apex (*Microdon*).

Abdomen of at least four visible segments, sometimes five or six; variable in shape, curvature and thickness; sometimes longer and narrower than thorax (*Sphaerophoria*), ovate (*Syrphus*), flat and broad (*Didea*), linear (*Xylota*), cylindrical (*Syritta*), clavate (*Baccha, Cerioides*), short and rounded (*Criorrhina*). Genitalia usually not prominent, often wholly concealed, the ♂ organs normally twisted to right; in ♀ simple.

Legs usually simple and not strong, especially in ♀, occasionally the hind femora greatly thickened or bearing tooth-like or spiny processes; tibiae often curved. Wings with characteristic venation; Sc ending about middle of wing; R_1 and R_{2+3} long, slightly sinuous; cell R_1 (marginal cell) open or closed near margin; R_{4+5} always simple, in certain genera dipped downwards into cell R_5 (first posterior cell), sometimes with a rudiment of R_5 projecting into same cell; cell R_5 always closed by upturned section of M_{1+2}; median cell always present; apical section of M_{3+4} upturned, the apical portion of these veins generally parallel with hind margin of wing. Cross-vein r-m before, at, or beyond middle of median cell, erect or oblique; first basal cell always longer than second; anal cell always long, closed; a false vein or *vena spuria* always present (except in *Graptomyza*), sometimes very faint.

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The above description of the characters of the subfamily is taken, slightly modified, from Brunetti (1923, pp. 23-5). The chief modification has been the substitution of the Comstock nomenclature of the veins. The family is considered by Brunetti to be allied to the Pipunculidae on the one hand and to the Conopidae on the other. Certainly the Syrphidae form a natural and well defined group.

Life History.—"The larvae are amphipneustic apparently acephalous, of about 11 uncertain segments, with rough skin, often pigmented, especially in Syrphinae; the posterior spiracles near together at tip of body. Puparium with thoracic spiracle-horns, and sometimes with smaller anterior horns that mark the position of the larval spiracles. Abdominal spiracles in pupa also prominent, much as in larva." (Brunetti, 1923, p. 25.)

Little is known of the breeding habits of Australian species; many species are aphidiphagous in the larval stage (*Syrphus*). The larvae of *Microdon* have been found in association with ants. Species of *Eristalis* live in drainage and have especially long extensile respiratory tubes—rat-tail larvae. One species of *Helophilus* breeds in rotting grass-tree stumps (*Xanthorrhoea*). Other species elsewhere live in decaying wood or vegetable matter, in the stems of plants or fungi, or the nests of Hymenoptera. Australian species of *Syritta* and *Eumerus* have been bred from fruit.

Subfamilies.—Various attempts have been made to subdivide the group into subfamilies. Even now there is no absolute concensus of opinion on the subject. Williston admits three subfamilies—Syrphinae, Eristalinae and Cerioidinae.

Brunetti, following Verrall, admits seven subfamilies—Syrphinae, Volucellinae, Eristalinae, Milesiinae, Chrysotoxinae, Microdontinae and Ceriinae.

Hardy admits six subfamilies as occurring in Australia, excluding the Volucellinae.

The Eristalinae, Microdontinae and Ceriinae or Cerioidinae constitute definite concepts sharply marked off from the Syrphinae. The position of the remaining subfamilies is open to question; in the Australian fauna at least the Milesiinae appear to form a natural group and are here retained. The Volucellinae, as far as *Volucella* is concerned, may constitute a natural group, but the separation from Syrphinae is broken down to a large extent by the inclusion of the genus *Graptomyza*, though Brunetti considers that the natural position of *Graptomyza* is in this group. In his key to the subfamilies, *Graptomyza* affords an exception to most of the characters used to separate the Volucellinae from the Syrphinae. The three characters cited in the key are the open or closed marginal cell, the apical section of fourth vein (R_{4+5}) not recurrent or recurrent, and the arista bare or plumose. *Graptomyza* differs from *Volucella* in the marginal cell being open, agrees with it in the recurrent vein, though this occurs in some genera (e.g. *Orthoneura*) of Syrphinae, and varies in the clothing of the arista. In regard to this last character Brunetti states (1923, p. 153) that a plumose arista is entirely foreign to the Syrphinae.

The general short ovate shape, produced epistome and plumose antennae would appear to be the main reasons for associating the genus with *Volucella* rather than with the Syrphinae. Whether the Volucellinae are entitled to subfamily rank is a question not to be debated here. It is tentatively included among the subfamilies represented in Australia in the key solely on the strength of the occurrence of *Graptomyza*. A peculiar feature of this latter genus is the complete

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The subfamily as defined in Brunetti is characterized by the elongate porrect antennae with dorsal arista, rarely with apical style. The anterior cross-vein (r-m) is stated to be normally before middle of discal cell. The elongate antennae would thus appear to over-ride the position of the anterior cross-vein (r-m). Brunetti (1923) states, "The value of both the position of the anterior cross vein and the elongated or porrected nature of the antennae may be over-estimated, especially the latter". Williston (1908, p. 251) writes, "I cannot approve of such associations as *Psarus, Callicera, Chrysotoxum* and *Sphecomyia* in the subfamily *Chrysotoxinae,* distinguished chiefly by the elongate antennae. . . . . The length of the antennae is always doubtfully a generic character even, and certainly cannot be used as a distinguishing character for larger groups". In his table of genera, he includes *Chrysotoxum* both among the genera with anterior cross-vein distinctly before the middle of the discal cell, and among those with anterior cross-vein near or beyond the middle of the discal cell.

The question is debated here, as a species has been described from Australia as *Chrysotoxum elongatum* Hardy, which has the anterior cross-vein (r-m) beyond the middle of the discal cell (mc). While this species certainly has an elongate porrect antenna, other characters, especially the shape of the abdomen and the thickened hind femora, would appear to exclude it from the genus *Chrysotoxum.* Apart from the elongate antennae the species has the facies and structure of several genera referred to the Milesiinae and I propose to place the species in that subfamily as a new genus. Typical members of the genus *Chrysotoxum* have not so far been recorded or described from Australia and the subfamily is therefore omitted from the key.

Table of Subfamilies of Syrphidae represented in Australia.

1. Cross-vein r-m before middle of median cell 2
   Cross-vein r-m at or beyond middle of discal cell 4
2. Antennae short or moderately long, generally pendent 3
   Antennae porrect, generally long; venation peculiar .... *Microdontinae*
3. Marginal cell open; apical section of fourth vein (M_{1+2}) not recurrent (rare exceptions); arista bare or at most slightly pubescent .... *Syrphinae*
   Marginal cell normally closed (open in *Graptomyza*); apical section of fourth vein distinctly recurrent; antennae plumose (bare in some species of *Graptomyza*) .... *Volucellinae*
4. Antennae generally pendent, not situated on a petiole; arista dorsal subbasal 5
   Antennae long, porrect, generally situated on a prominent petiole; an apical style present .... *Cerioidinae*
5. Third longitudinal vein (R_{4+5}) distinctly looped into underlying cell ...... *Eristalinae*
   Third longitudinal vein (R_{4+5}) at most slightly curved downward .... *Milesiinae*

The above key is based mainly on that given by Brunetti and where possible his wording has been given. Under this key the species described as *Chrysotoxum elongatum* Hardy will fall into the Milesiinae.

The genus *Dissoptera* Edwards cannot be placed in the key; it is provisionally included among the Eristalinae, but the position of r-m would exclude it from that subfamily.

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Subfamily CERIOIDINAE.

CERIOIDES.

Ceria Fabricius, 1794, p. 277.—*Cerioides* Rondani, 1850, p. 211.—*Sphiximorpha* Rondani, 1850, p. 212.

Elongate wasp-like species characterized by the long porrect antennae, with terminal style, situated on an antennal tubercle or pedicel, which is usually long and cylindrical. First antennal segment long, cylindrical, second and third segments broad and flattened; face long and produced downwards, without definite tubercle, though somewhat humped above the oral margin; eyes contiguous in the male, widely separated in the female, bare. Abdomen elongate, more or less club-shaped, in some species greatly constricted at base, so that abdomen appears pedunculate. Wings with R_{2+3} bent forwards at apex to join costa; R_{4+5} with a more or less pronounced backward dip between r-m and the junction of R_{4+5} with M_1; M_{1+2} bent backwards at apex of mc; r-m oblique, situated beyond middle of mc; *vena spuria* well marked.

This genus—the sole member of the subfamily—is represented in Australia by a moderate number of species, most of which have been undescribed up to the present. Hardy (1921, p. 13) records three names as applying to Australian species, but is doubtful of their allocation; he also mentions having four species under examination.

Macquart (1850, p. 128) described and figured *Ceria australis*, recording the species from Tasmania. The question of the identity of this species is discussed later.

Saunders (1845) described two species, *Ceria ornata* and *Ceria breviscapa*, both of which have been recognized in the material before me.

Curran and Bryan, in their recent paper (1926) published in these Proceedings, describe a new species—*Cerioides subarmata*—of which a paratype is before me. In the present paper, nine new species are added to the genus, five of them being allied to *C. ornata* and four to *C. subarmata*. The genus as represented in Australia is divisible into two main groups on the structure of the abdomen; in *C. ornata* and its allies the abdomen, though narrower at the base, is not greatly constricted as in *C. breviscapa* and other species. *C. breviscapa* is separated from all other species by reason of the very short antennal tubercle or pedicel.

Distribution.—The genus so far as at present known is principally distributed along the eastern portion of Australia and is richest in species in Queensland. Thus of the twelve species known (excluding *C. australis*, of which both identity and habitat are doubtful), *C. ornata* occurs from N.W. Australia, through Queensland into N.S. Wales; *C. variabilis* in Queensland and probably N.S. Wales; *C. apicalis*, *C. alboseta*, *C. macleayi*, *C. subarmata*, *C. doddi* and *C. facialis* are known only from Queensland; *C. platypus* from Queensland and S. Australia; *C. mastersi* from S. Australia; *C. opuntiae* from N.S. Wales, while *C. breviscapa* occurs in N.S. Wales, South Australia and probably Victoria. Thus Queensland has nine species, as against four from N.S. Wales, one from Victoria and three from S. Australia. No species are known from Western Australia (excluding N.W. Australia), but as the family has not been extensively collected there, it is quite possible that species of this genus will ultimately be found in that State. The fact that so many of the species are represented by single specimens suggests that many more species still await discovery, especially in the tropical parts of Australia.

It should be noted that Brunetti (1923, p. 323) retains the name *Ceria* in preference to *Cerioides*. This is not the place to discuss the question and I prefer to use the more generally accepted nomenclature.

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Distribution.—The genus so far as at present known is principally distributed along the eastern portion of Australia and is richest in species in Queensland. Thus of the twelve species known (excluding *C. australis*, of which both identity and habitat are doubtful), *C. ornata* occurs from N.W. Australia, through Queensland into N.S. Wales; *C. variabilis* in Queensland and probably N.S. Wales; *C. apicalis*, *C. alboseta*, *C. macleayi*, *C. subarmata*, *C. doddi* and *C. facialis* are known only from Queensland; *C. platypus* from Queensland and S. Australia; *C. mastersi* from S. Australia; *C. opuntiae* from N.S. Wales, while *C. breviscapa* occurs in N.S. Wales, South Australia and probably Victoria. Thus Queensland has nine species, as against four from N.S. Wales, one from Victoria and three from S. Australia. No species are known from Western Australia (excluding N.W. Australia), but as the family has not been extensively collected there, it is quite possible that species of this genus will ultimately be found in that State. The fact that so many of the species are represented by single specimens suggests that many more species still await discovery, especially in the tropical parts of Australia.

It should be noted that Brunetti (1923, p. 323) retains the name *Ceria* in preference to *Cerioides*. This is not the place to discuss the question and I prefer to use the more generally accepted nomenclature.

Table of Species of Cerioides.

1. Basal abdominal segments not greatly constricted 2
Basal abdominal segments constricted, i.e., abdomen pedunculate 7
2. Second abdominal segment with elevations and depressions 3
Second abdominal segment with even surface 5
3. Basal abdominal segments mainly black, at most with reddish apical margin to second segment 4
Basal abdominal segments largely reddish ...... *ornatus* Saund. ? *australis* Macq.
4. Posterior femora normal in both sexes .... *opuntiae*, n. sp.
Posterior femora thickened and flanged in ♂ .... *platypus*, n. sp.
5. Third and fourth abdominal segments with subapical elevations; style white .... *alboseta*, n. sp.
Third and fourth abdominal segments with even surface 6
6. Costal cell infuscated; third abdominal segment black with apical band; (in ♂ third abdominal segment shorter than fourth) .... *variabilis*, n. sp.
Costal cell clear; third abdominal segment reddish-orange with a triangular basal area black (in ♂ third abdominal segment longer than fourth) ..... *apicalis*, n. sp.
7. Antennal tubercle very short .... *breviscapa* Saund.
Antennal tubercle long, cylindrical 8
8. Dark anterior margin of wing not extending into dip of R_{4+5} 9
Dark anterior margin of wing including dip of R_{4+5} 10
9. Second abdominal segment largely reddish; thorax subvittate; (in ♀ lateral frontal porose areas present) .... *macleayi*, n. sp.
Second abdominal segment black with narrow yellow margin; thorax not vittate; (frontal porose areas absent in ♀) .... *doddi*, n. sp.
10. Second abdominal segment with constricted portion very short, width at apex nearly equal to third abdominal segment .... *mastersi*, n. sp.
Second abdominal segment with longer constricted portion, width at apex much narrower than that of third segment 11
11. Antennal tubercle as long as first and second antennal joints combined (♂ unknown) .... *facialis*, n. sp.
Antennal tubercle shorter; (♂ with eyes separated, posterior trochanters tuberculate, and posterior femora incrassate) .... *subarmata* C. & B.

Cerioides australis Macq. is doubtfully bracketed in the table with *C. ornatus* Saund. since it is probable that both names apply to but one species.

CERIOIDES ORNATUS (Saund.).

Ceria ornata Saund., 1845, p. 64, Plate 4, fig. 3.—*Cerioides ornata* de Meijere, 1908, p. 197; Hardy, 1921, p. 13.

I believe that this name should apply to a fairly common and widespread species which is variable in the coloration of the second and terminal abdominal segments. In the majority of the specimens before me, which are mostly males, the first segment is black with rufous sides, and the second rufous with a more or less extensive black patch in centre, while, as a rule, the posterior margin of the second segment is bright yellow. In one male from Sydney the margin is rufous like the rest of the segment, the black patch being practically non-existent, and in a female from Gayndah, the same coloration occurs. In most of the specimens the fourth segment is black with rufous or yellow margin and dusted over with yellow, to a greater or less extent in different specimens; in the above-mentioned female, the clothing is very dense and bright golden in colour.

In his original description Saunders, as mentioned by de Meijere, has taken the first and second segments together as one, and describes it as "rufous, margined with yellow posteriorly and stained with dusting on upper basal side", while the fourth joint, wrongly named the third is described as "rufous . . . . with a yellow posterior margin". This would fit the Gayndah female fairly well, except that the margins are rufous rather than yellow. I suspect, however, that the yellow may darken to rufous with age. This species would appear to be the

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I am, however, doubtful if the *Cerioides ornata* redescribed by de Meijere is the same species, the second abdominal segment being from the description black with a yellow border and the extreme posterior edge black. This would appear to fit *C. variabilis* as does also the smaller size. De Meijere also mentions that the two inner golden flecks on the fore border of the thorax are absent in his specimens; they are distinct on the species I regard as *C. ornata*, but not on *C. variabilis*.

Hab.—N.W. Coast (type); North Coast, N. Holland (one old specimen in Macleay Museum), Melville Island (S. Australian Museum); Queensland: Cape York, Claudie R., Endeavour River, Cairns, Stewart River, Pt. Denison, Rockhampton, Eidsvold, Yeppoon, Westwood, Gayndah; N.S. Wales: Sydney.

Twenty-four specimens of this species, including both sexes, are under examination.

CERIOIDES AUSTRALIS (Macq.).

Ceria australis Macquart, 1850, p. 128; de Meijere, 1907, p. 198.—*Cerioides australis* Hardy, 1921, p. 13.

The description of this species closely agrees with that of *C. ornatus* Saunders, with the exception that the first antennal joint is described as being as long as the prolongation of the head on which it is situated. The figure given by Macquart shows the same feature. If this is correct the species is unknown to me, but I suspect that a mistake has been made and that the species is the common one herein regarded as *C. ornatus* Saunders. It may be noted that Hardy mentions that no species of the genus exists in recent collections from Tasmania, but it is quite likely that the locality is wrongly stated, as is the case of several other descriptions of diptera in the same part of Macquart's work.

CERIOIDES OPUNTIAE, n. sp.

Male. Head black; eyes contiguous for about one-seventh of head width, vertex black with a yellow spot on each side, frontal triangle yellow, dark brown around root of antennal tubercle, orbits white tomentose; face yellow, with broad median dark brown stripe, vertical sides black; cheeks black; posterior orbits white tomentose; antennal tubercle dark brown, shorter than usual, but longer than in *breviscapa*, the first antennal joint very slightly longer than tubercle, second joint about half length of first; third joint not quite as long as first, all the joints blackish-brown, style short, dark. Mesonotum black, rather closely granulate; a yellow spot on humeral angle, an obscure reddish-brown mark between humeral angle and suture. Scutellum reddish-brown, yellowish at base. Pleurae black with a yellow spot on posterior half of mesopleuron. Abdomen not constricted at base; first and second segments black, rather coarsely granulate, second with an oblique impression on each side from midline at base to near apex at lateral margins, the posterior margin somewhat raised; third black with rather broad yellow apical band, the segment somewhat longer than second, a well marked transverse impression present on each side near middle; fourth same as that commented upon by Hardy under this name. "*Cerioides ornata* Saunders has the first segment of the abdomen only slightly constricted. . . . Two species exhibit this character, and one of these has a pair of callosities on the second abdominal segment. It was found labelled under Saunders's name, and is represented by specimens from Queensland and New South Wales". All my specimens show a distinct swelling on either side of the middle line, the latter being somewhat depressed; the apical margin of this segment is also raised.

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Wings mainly hyaline, a narrow dark band extending from base to near apex, leaving clear the costal cell, the whole of cell R_3, except extreme base, and the apical third of cell R_1, except that the extreme apex of vein R_{2+3} is suffused on each side. Calypters whitish with yellow border; halteres yellow.

Length, 8 mm.

Hab.—New South Wales: Cuttebrai Creek (Burrows, August, 1917, bred from decaying prickly pear), Biniguy (J. Mann, March, 1923), Nevertire (March, 1926).

Type from the collection of the Government Entomologist, Department of Agriculture. In the paratypes the transverse impression on the third segment is hardly traceable; in other respects the specimens agree.

The species is the only one I have seen in which the antennal tubercle and the first antennal joint are nearly equal; at first sight they appear so, but on actual measurement the first joint is slightly longer. The species, however, can hardly be *C. australis* Macq., since the descriptions of the abdominal segments and of the wing markings do not fit *C. opuntiae*, whereas they do agree with *C. ornatus* Saund.

Type presented to the Macleay Museum.

CERIOIDES PLATYPUS, n. sp.

♂. Head similar to *C. variabilis*, the vertical and ocellary region darker brown, the facial stripe less dilated around antennal tubercle, but with cross-line more evident so that the dark markings are distinctly cruciform; cheeks entirely dark; second antennal joint longer than third and approximately equal to first joint; style broken. Mesonotum black, without yellow markings, the surface set with minute granules, the humeral and post-alar prominences dark reddish-brown, sublaevigate; inner end of suture reddish-brown; pubescence pale. Scutellum yellow with broad apical black marking. Pleural segments black with a yellow patch on posterior portion of mesopleuron. Abdomen not greatly constricted at base, the first segment black, the second longer than first, black with a broad apical reddish-orange band occupying almost half the segment, but slightly narrower at sides, the basal portion of segment raised slightly on each side; third and fourth segments black with orange posterior border; third segment slightly longer than fourth, longer but not greatly wider than second; pubescence mainly yellow on all the segments. Venter black with pale segmentations and clothed with very long pale straw coloured silky pubescence. Legs reddish-brown, the coxae, basal two-thirds of femora with exception of extreme base of femora, tarsal segments with exception of first segment, dark brown; posterior femora greatly thickened, with a flange-like projection on apical third of antero-ventral margin; posterior tibiae bowed, the ventral surface bisinuate; tarsal joints, including metatarsi, flattened, short and greatly widened; the posterior metatarsi longer and less noticeably widened; pubescence on legs pale straw coloured and distinctly longer than in other species, the ventral surface of intermediate tarsi with especially long pubescence; a patch of short black stiff setae on flanges of segment long, nearly twice length of third, black, with a small triangular yellow patch at apex, pubescence short, appressed, mainly pale. Venter black. Legs with coxae and basal two-thirds of femora black to blackish-brown, the apical third of femora reddish-brown, tending to yellow at knees, tibiae yellow to reddish-brown, becoming infuscate in apical third; tarsi dark, moderately flattened; posterior femora not dilated or incrassate, some short spines on ventral margin in apical third.

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♀. Similar, head as in *C. variabilis*, but dark band on front extending over ocellary region and vertex, and facial stripe cruciform; antennae dark brown, third joint and style lighter; first joint longer than second, the latter approximately as long as third. Thorax as in ♂, but inner portion of transverse suture clothed with golden tomentum (traces of this are present in the ♂); abdomen similar in colour, but fourth segment rufous yellow with bright reddish-orange margin; third segment noticeably wider than second and considerably longer than fourth; posterior femora normal, without flange, the tarsi less dilated, though broader than normal, the whole legs reddish-brown, only slightly darker on tarsal segments.

Length, ♂. 12·5, ♀. 11 mm.

Hab.—S. Australia; holotype and allotype without exact locality in Australian Museum collection (K 36977). Queensland: Magnetic Island (A. M. Lea, S. Australian Museum).

The ♂ of this species can readily be distinguished by the femoral and tarsal structure. The ♀ differs from *C. ornatus* in the first abdominal segment being entirely black and from *C. variabilis* also by the structure of the second segment, and the broader tarsal joints.

CERIOIDES ALBOSETA, n. sp.

♂. Head similar to *C. variabilis*. but with median dark vitta not reaching mouth margin, lower margin of vertical sides of face more extensively yellowish; cheeks with more pronounced silvery pubescence and tomentum; antennae similar, but first joint about equal in length to second, the remaining joints broader than in *C. variabilis* and with a conspicuously white style. Mesonotum as in *C. variabilis*; scutellum yellow with dark base; pleura with large yellow spot involving the greater portion of mesopleuron. Abdomen coloured much as in *C. variabilis*; first segment reddish-yellow with lighter yellow side margins; second segment black with indications of a subapical transverse band; third segment slightly longer and wider than second, but considerably shorter than fourth, black with reddish-yellow apical border; third and fourth segments each with a low but conspicuous hump in midline near posterior third, the fourth segment slightly depressed on each side of elevation and with a subapical transverse sulcus, black with rather narrow reddish-yellow apical border. Legs as in *C. variabilis* with silvery pubescence on coxae more conspicuous. Wings coloured as in *C. variabilis*.

Length, 10 mm.

Hab.—Queensland: Gordonvale (December, 1919), Cairns District (Dodd), Port Curtis (Macleay Museum), Somerset (S. Australian Museum).

While closely allied to *C. variabilis*, the difference in the antennal joints and the presence of the protuberances on the third and fourth abdominal segments prevent me regarding it as the same species.

Two specimens (♂, ♀) in the Queensland Museum belong to this species. The ♂ (Brisbane) has the face all yellow, the median stripe and dark of lateral areas being merely indicated by being semitransparent; the general colour is brighter yellow and the apical band on second segment more distinct. In the ♀ (no locality) the eyes are separated by one-sixth of total head width, the front is reddish-yellow with a darker brown patch on each side anteriorly; the band posterior femora. Wings clear with dark brown anterior margin limited posteriorly as in *C. variabilis*. Halteres yellow; a bright yellow knob present at base of abdomen behind halteres.

♀. Similar, head as in *C. variabilis*, but dark band on front extending over ocellary region and vertex, and facial stripe cruciform; antennae dark brown, third joint and style lighter; first joint longer than second, the latter approximately as long as third. Thorax as in ♂, but inner portion of transverse suture clothed with golden tomentum (traces of this are present in the ♂); abdomen similar in colour, but fourth segment rufous yellow with bright reddish-orange margin; third segment noticeably wider than second and considerably longer than fourth; posterior femora normal, without flange, the tarsi less dilated, though broader than normal, the whole legs reddish-brown, only slightly darker on tarsal segments.

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CERIOIDES VARIABILIS, n. sp.

? *Cerioides ornatus* de Meijere (1907), *nec* Saunders (1845).

♂. Eyes bare, meeting in middle line along anterior third of inner margin; ocellary triangle reddish-brown, yellow in front; frontal triangle and face bright yellow with a median dark brown stripe, widened around the antennal tubercle, sometimes with an obscure extension to eye margin on each side; antennal tubercle cylindrical, reddish-brown; lateral portion of face black, shining, cheeks narrow, black with brown border; occiput black, reddish-brown above, the posterior margin of eye clothed with whitish tomentum becoming golden on upper portion. Antennae dark brown, the apical joints somewhat lighter, first joint about two-thirds length of antennal tubercle, second joint shorter and wider than first, third joint about as long as second. Mesonotum black, set with small granules, finer and closer on posterior portion; humeral tubercles bright reddish-yellow, a similar prominence present on lateral margin in front of suture and a patch of golden pubescence present in suture at inner end. Scutellum bright yellow with brownish-red apex and sides, laevigate with sparse granules. Pleurae black, with or without a reddish-yellow spot on mesopleuron. Abdomen not markedly constricted at base; first segment rather closely granulate, depressed in midline at base, reddish-brown with an indefinite median black mark posteriorly and reddish-yellowish side margins; second segment entirely black, the surface even without depressions or elevations, about as long as first; third black with bright reddish-yellow posterior border, longer and broader than second; fourth black, slightly suffused with rufous posteriorly and with a reddish posterior margin, strongly convex and longer than third segment; pubescence short, black on dark areas, pale yellow on lighter and on greater portion of fourth segment. Venter black with narrow pale segmentations. Legs reddish-brown, yellowish on trochanters and extreme base of femora, knees and basal third of tibiae; base of anterior and middle femora darker; posterior femora not abnormally dilated, with some spinose setae on ventral surface in apical portion.

Wings clear with anterior portion broadly and deeply infuscate, the dark portion bounded by the *vena spuria* in basal two-thirds and by R_{4+5} in apical third; venation normal. Halteres yellow.

♀. Eyes separated. Posterior portion of front and vertex bright reddish-yellow, with a broad black transverse band behind antennal tubercle; third antennal joint longer than second. Thorax as in ♂. Second abdominal segment black with a subapical reddish-yellow band, slightly wider in centre and separated from extreme edge by a narrow dark border; third segment considerably longer than fourth; fourth segment more extensively reddish and with denser tomentum.

Length, 10 mm.

Holotype and allotype and paratopotype ♂, Westwood, Queensland (Goldfinch, 10·23); paratypes ♂, ♀ Eidsvold (Mackerras), ♀ Gayndah (Australian Museum), ♂, ♀ Rockhampton, ♀ Port Curtis (Macleay Museum).

A series of 12 ♂ and 18 ♀ of this species are under examination. Despite the difference in the banding of the second abdominal segment and the difference in the length of the third abdominal segment in the two sexes, I have no doubt that the sexes belong to but one species.

on second abdominal segment is clear yellow and well defined and the third abdominal segment is distinctly longer than the fourth; on the latter segment the median prominence is almost obsolete. Length, 11 mm.

CERIOIDES VARIABILIS, n. sp.

? *Cerioides ornatus* de Meijere (1907), *nec* Saunders (1845).

♂. Eyes bare, meeting in middle line along anterior third of inner margin; ocellary triangle reddish-brown, yellow in front; frontal triangle and face bright yellow with a median dark brown stripe, widened around the antennal tubercle, sometimes with an obscure extension to eye margin on each side; antennal tubercle cylindrical, reddish-brown; lateral portion of face black, shining, cheeks narrow, black with brown border; occiput black, reddish-brown above, the posterior margin of eye clothed with whitish tomentum becoming golden on upper portion. Antennae dark brown, the apical joints somewhat lighter, first joint about two-thirds length of antennal tubercle, second joint shorter and wider than first, third joint about as long as second. Mesonotum black, set with small granules, finer and closer on posterior portion; humeral tubercles bright reddish-yellow, a similar prominence present on lateral margin in front of suture and a patch of golden pubescence present in suture at inner end. Scutellum bright yellow with brownish-red apex and sides, laevigate with sparse granules. Pleurae black, with or without a reddish-yellow spot on mesopleuron. Abdomen not markedly constricted at base; first segment rather closely granulate, depressed in midline at base, reddish-brown with an indefinite median black mark posteriorly and reddish-yellowish side margins; second segment entirely black, the surface even without depressions or elevations, about as long as first; third black with bright reddish-yellow posterior border, longer and broader than second; fourth black, slightly suffused with rufous posteriorly and with a reddish posterior margin, strongly convex and longer than third segment; pubescence short, black on dark areas, pale yellow on lighter and on greater portion of fourth segment. Venter black with narrow pale segmentations. Legs reddish-brown, yellowish on trochanters and extreme base of femora, knees and basal third of tibiae; base of anterior and middle femora darker; posterior femora not abnormally dilated, with some spinose setae on ventral surface in apical portion.

Wings clear with anterior portion broadly and deeply infuscate, the dark portion bounded by the *vena spuria* in basal two-thirds and by R_{4+5} in apical third; venation normal. Halteres yellow.

♀. Eyes separated. Posterior portion of front and vertex bright reddish-yellow, with a broad black transverse band behind antennal tubercle; third antennal joint longer than second. Thorax as in ♂. Second abdominal segment black with a subapical reddish-yellow band, slightly wider in centre and separated from extreme edge by a narrow dark border; third segment considerably longer than fourth; fourth segment more extensively reddish and with denser tomentum.

Length, 10 mm.

Holotype and allotype and paratopotype ♂, Westwood, Queensland (Goldfinch, 10·23); paratypes ♂, ♀ Eidsvold (Mackerras), ♀ Gayndah (Australian Museum), ♂, ♀ Rockhampton, ♀ Port Curtis (Macleay Museum).

A series of 12 ♂ and 18 ♀ of this species are under examination. Despite the difference in the banding of the second abdominal segment and the difference in the length of the third abdominal segment in the two sexes, I have no doubt that the sexes belong to but one species.

This is probably the species redescribed by de Meijere under the name of *Cerioides ornatus* (Saund.), but it does not agree with the original description as well as the species identified as *C. ornatus* in this paper.

The pleural patch is absent in the types and in certain other specimens, but every grade in size can be found between a large conspicuous patch and complete absence.

Two females in the collection of Mr. J. Mann, Brisbane, may represent extreme varieties of this species; in one specimen the band on the second segment is absent, the third segment is almost entirely orange, as is also the fourth; in the other the subapical band on the second segment is present as in normal specimens, but the orange colour of the third is largely increased, though not to the same extent as in the first specimen.

CERIOIDES APICALIS, n. sp.

♂. Head black; a small spot on each side of forehead external to antennal tubercle and a large patch on each side of midline of face extending to eye margin, yellow, the lower portion of face, excepting midline, and the lateral black areas on each side of antennal tubercle clothed with white tomentum, similar tomentum also present along the margin of eye; pubescence scanty, whitish, longer on posterior inferior angle of head; eyes bare, meeting for a short distance in midline. Antennal tubercle dark brown, long. Antennal joints dark brown, first shorter than tubercle, second joint as long as first, but wider, third joint shorter, apical joint dark.

Mesonotum black, finely granulate, a small golden tomentose spot on each side of midline at inner end of transverse suture; humeral angles slightly shining with well marked reddish-yellow tooth at upper and outer corner. Scutellum black, slightly shining, the posterior margin pale brown, surface less closely granulate than on mesonotum. Pleural segments with whitish tomentum.

Abdomen not constricted at base, three basal segments black, the extreme apical portion of second segment narrowly reddish; third segment with large black patch extending from base to middle of segment in midline and narrowed to half that width at sides, rest of the segment bright orange; fifth segment orange, yellowish at base; under surface black; pubescence black on dark areas of dorsum, yellow on orange areas; longer and white at sides and on under surface.

Legs black, the extreme apices of anterior and middle femora and the apical third of posterior femora reddish-brown; extreme apices of the anterior and intermediate tibiae, the whole of the posterior tibiae and of the tarsi reddish-brown.

Wings clear, with a dark brown band extending along the anterior margin, except in subcostal cell, the posterior margin bounded by Cu_1 as far as discal cell, by *vena spuria* as far as r-m, and thence by R_{4+5}.

Length, 11 mm.

Hab.—Queensland: Gayndah (G. Masters).

A single specimen in the collection of the Australian Museum.

This species is most closely allied to *C. variabilis*, n. sp., but, *inter alia*, differs in the very large third abdominal segment which largely conceals the fourth, whereas in the male of *C. variabilis* the fourth is actually longer than the third, though in the female the third segment is considerably longer than the fourth. The colour pattern is also different, and the brown of the wings is absent from the subcostal cell, and extends further posteriorly as described; in

This is probably the species redescribed by de Meijere under the name of *Cerioides ornatus* (Saund.), but it does not agree with the original description as well as the species identified as *C. ornatus* in this paper.

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CERIOIDES APICALIS, n. sp.

♂. Head black; a small spot on each side of forehead external to antennal tubercle and a large patch on each side of midline of face extending to eye margin, yellow, the lower portion of face, excepting midline, and the lateral black areas on each side of antennal tubercle clothed with white tomentum, similar tomentum also present along the margin of eye; pubescence scanty, whitish, longer on posterior inferior angle of head; eyes bare, meeting for a short distance in midline. Antennal tubercle dark brown, long. Antennal joints dark brown, first shorter than tubercle, second joint as long as first, but wider, third joint shorter, apical joint dark.

Mesonotum black, finely granulate, a small golden tomentose spot on each side of midline at inner end of transverse suture; humeral angles slightly shining with well marked reddish-yellow tooth at upper and outer corner. Scutellum black, slightly shining, the posterior margin pale brown, surface less closely granulate than on mesonotum. Pleural segments with whitish tomentum.

Abdomen not constricted at base, three basal segments black, the extreme apical portion of second segment narrowly reddish; third segment with large black patch extending from base to middle of segment in midline and narrowed to half that width at sides, rest of the segment bright orange; fifth segment orange, yellowish at base; under surface black; pubescence black on dark areas of dorsum, yellow on orange areas; longer and white at sides and on under surface.

Legs black, the extreme apices of anterior and middle femora and the apical third of posterior femora reddish-brown; extreme apices of the anterior and intermediate tibiae, the whole of the posterior tibiae and of the tarsi reddish-brown.

Wings clear, with a dark brown band extending along the anterior margin, except in subcostal cell, the posterior margin bounded by Cu_1 as far as discal cell, by *vena spuria* as far as r-m, and thence by R_{4+5}.

Length, 11 mm.

Hab.—Queensland: Gayndah (G. Masters).

A single specimen in the collection of the Australian Museum.

This species is most closely allied to *C. variabilis*, n. sp., but, *inter alia*, differs in the very large third abdominal segment which largely conceals the fourth, whereas in the male of *C. variabilis* the fourth is actually longer than the third, though in the female the third segment is considerably longer than the fourth. The colour pattern is also different, and the brown of the wings is absent from the subcostal cell, and extends further posteriorly as described; in *variabilis* the whole of the subcostal cell is dark and the dark border is limited posteriorly by the *vena spuria* and thence by R_{4+5}; in both species a small portion of the first basal cell anterior to the false vein at the extreme apex of the cell is clear.

CERIOIDES BREVISCAPA (Saund.).

Ceria breviscapa Saunders, 1845, p. 65, Pl. 4, f. 5.

This species is readily distinguished by the short and comparatively wide antennal tubercle; the facial marking is distinctly cruciform and the vertical sides of face entirely dark; the first antennal joint is somewhat shorter than the remaining joints; the mesonotum is black with reddish-yellow or yellow humeral angles, presutural callus, posterolateral border and scutellum; there is no pleural spot. The abdomen is constricted at base, the first segment, which is black, being evenly decreased from base to apex, while the second, which is black at base and reddish-yellow at apex, is narrow in basal half and thence suddenly widened to apex; the two joints are subequal; the remaining segments are black with apical reddish-yellow bands. In the wings the brown anterior border is bounded posteriorly by the *vena spuria* as far as the r-m cross-vein, thence by R_{4+5}, including the dip in the latter which is less deep than usual; Cu_1, m-cu, and M_{3+4} are also shaded.

In the female the lateral areas in front are rugosely sculptured, though not deeply punctate, also the second abdominal segment may be entirely reddish-yellow as in a female from Ropes Creek, whereas in another female from Mittagong the reddish-yellow is replaced by a yellow band at apex. In this specimen also the apical bands on the third and fourth segments are first reddish-yellow and then yellow, while the scutellum is stained with blackish at base. In a male from South Australia only the humeral angles and scutellum are yellow; while the reddish-yellow markings on abdomen are clear yellow, the dark markings on face are less cruciform in shape.

Hab.—N.S. Wales: Ropes Creek, Mittagong, Toronto; S. Australia.

I think there can be little doubt that the specimens before me are correctly identified; the only particulars in which they differ from the original description are that there are only two (i.e. on the humeral angles) not three yellow spots on anterior margin of thorax and that the scutellum is not dark brown. It is to be noted that in one specimen the scutellum is blackish-brown at base. The first and second abdominal segments have been taken together as the first in Saunders's description. The type is stated to be from Port Phillip, S. Australia; probably Port Phillip in Victoria (Melbourne) is intended.

CERIOIDES MACLEAYI, n. sp.

♂. Head yellow, median line of face from mouth margin to antennal tubercle, and a broad band on upper portion of the vertical sides of face dark brown; cheeks yellow; occipital region blackish, yellowish-brown above; vertex blackish around ocelli; antennal tubercle long, light brown; antennae darker, the first joint shorter than tubercle, longer than second joint, the latter very slightly longer than third. Mesonotum blackish, humeral angles yellowish, a yellowish-brown mark extending backwards on each side from humeral angle to beyond transverse suture; a second similar but a narrower line from near transverse suture to posterior margin somewhat internal to first line, the posterolateral borders and an oval spot on each side of midline at posterior margin yellowish-brown; surface of mesonotum finely granulose. Scutellum yellowish-brown with black sub-

variabilis the whole of the subcostal cell is dark and the dark border is limited posteriorly by the *vena spuria* and thence by R_{4+5}; in both species a small portion of the first basal cell anterior to the false vein at the extreme apex of the cell is clear.

CERIOIDES BREVISCAPA (Saund.).

Ceria breviscapa Saunders, 1845, p. 65, Pl. 4, f. 5.

This species is readily distinguished by the short and comparatively wide antennal tubercle; the facial marking is distinctly cruciform and the vertical sides of face entirely dark; the first antennal joint is somewhat shorter than the remaining joints; the mesonotum is black with reddish-yellow or yellow humeral angles, presutural callus, posterolateral border and scutellum; there is no pleural spot. The abdomen is constricted at base, the first segment, which is black, being evenly decreased from base to apex, while the second, which is black at base and reddish-yellow at apex, is narrow in basal half and thence suddenly widened to apex; the two joints are subequal; the remaining segments are black with apical reddish-yellow bands. In the wings the brown anterior border is bounded posteriorly by the *vena spuria* as far as the r-m cross-vein, thence by R_{4+5}, including the dip in the latter which is less deep than usual; Cu_1, m-cu, and M_{3+4} are also shaded.

In the female the lateral areas in front are rugosely sculptured, though not deeply punctate, also the second abdominal segment may be entirely reddish-yellow as in a female from Ropes Creek, whereas in another female from Mittagong the reddish-yellow is replaced by a yellow band at apex. In this specimen also the apical bands on the third and fourth segments are first reddish-yellow and then yellow, while the scutellum is stained with blackish at base. In a male from South Australia only the humeral angles and scutellum are yellow; while the reddish-yellow markings on abdomen are clear yellow, the dark markings on face are less cruciform in shape.

Hab.—N.S. Wales: Ropes Creek, Mittagong, Toronto; S. Australia.

I think there can be little doubt that the specimens before me are correctly identified; the only particulars in which they differ from the original description are that there are only two (i.e. on the humeral angles) not three yellow spots on anterior margin of thorax and that the scutellum is not dark brown. It is to be noted that in one specimen the scutellum is blackish-brown at base. The first and second abdominal segments have been taken together as the first in Saunders's description. The type is stated to be from Port Phillip, S. Australia; probably Port Phillip in Victoria (Melbourne) is intended.

CERIOIDES MACLEAYI, n. sp.

♂. Head yellow, median line of face from mouth margin to antennal tubercle, and a broad band on upper portion of the vertical sides of face dark brown; cheeks yellow; occipital region blackish, yellowish-brown above; vertex blackish around ocelli; antennal tubercle long, light brown; antennae darker, the first joint shorter than tubercle, longer than second joint, the latter very slightly longer than third. Mesonotum blackish, humeral angles yellowish, a yellowish-brown mark extending backwards on each side from humeral angle to beyond transverse suture; a second similar but a narrower line from near transverse suture to posterior margin somewhat internal to first line, the posterolateral borders and an oval spot on each side of midline at posterior margin yellowish-brown; surface of mesonotum finely granulose. Scutellum yellowish-brown with black subtriangular patch in middle. Pleural segments black, a large yellowish patch extending over posterior portion of mesopleuron and covering adjacent portions of the sternopleuron and pteropleuron.

Abdomen greatly contracted at base, wasp-like; first segment narrowed from base, rather closely punctate, second long, narrowest in basal third and widened slightly to apex; sublaevigate at base, closely punctured from middle to apex, the remaining segments of the abdomen much wider and elongate, together forming an egg-shaped mass; the third and fourth segments about equal in length; first and second segments reddish-brown, paler at base and apex of second segment; third segment black with yellow-brown band at apex; fourth segment black with yellowish apex, the whole segment rather densely clothed with long appressed yellow pubescence. Under surface with basal segments yellowish-brown, remainder black.

Legs reddish-yellow, the extreme bases of the anterior and middle femora and the basal half of posterior femora somewhat darkened, the posterior femora not greatly thickened, but with rather numerous small spines along under surface in apical half.

Wings clear with broad vitta along the anterior margin extending back as far as *vena spuria* to opposite base of median cell; from thence as a more or less straight line to above apex, leaving unshaded the whole of the apical portion of the first basal cell and the dip of R_{4+5} into the first posterior cell.

♀. Similar to male. Front with a broad transverse dark band in the midline forming a laevigate carina, on each side of which is a closely punctate or porose area, the punctures not being continued to eye margin; second and third antennal joints subequal.

Length, 8-10 mm.

Hab.—Queensland: Rockhampton, four males and two females in the collection of the Macleay Museum; Brisbane (12.11.12), a female in the Queensland Museum.

CERIOIDES DODDI, n. sp.

♀. Closely allied to *Cerioides macleayi.* Face yellow, with median vitta broader; vertical sides black, except on lower borders, cheeks yellow with white tomentum; forehead with a transverse black band extending across the forehead behind antennal tubercle; ocellary region black leaving a pair of yellow spots between that and the transverse black band of forehead; antennal tubercle long, dark brown; antennae dark brown, apical joints lighter, first joint but little shorter than the tubercle and twice the length of the second joint, the latter slightly shorter than the third joint, style dark.

Thorax black with yellow humeral angles, a yellow spot on lateral border in front of transverse suture and yellow-brown posterolateral borders; indistinct yellow pubescence along the transverse suture. Scutellum yellow with black band at base; surface of mesonotum and basal portion of scutellum closely granulose. Pleural segments black with yellowish spot on mesopleuron extending on to sternopleuron, but not on to pteropleuron.

Abdomen greatly contracted at base, wasp-like; first segment narrowed to apex; second segment about equal in length to first, narrow at base, widened to apex, narrowest portion of abdomen at junction of two segments, both segments granulose; remaining segments elongate-ovate, much wider; basal segments black with yellow band at apex of second segment; third and fourth segments black with yellow band at apex of each; the two segments about equal in length, the fourth triangular patch in middle. Pleural segments black, a large yellowish patch extending over posterior portion of mesopleuron and covering adjacent portions of the sternopleuron and pteropleuron.

Abdomen greatly contracted at base, wasp-like; first segment narrowed from base, rather closely punctate, second long, narrowest in basal third and widened slightly to apex; sublaevigate at base, closely punctured from middle to apex, the remaining segments of the abdomen much wider and elongate, together forming an egg-shaped mass; the third and fourth segments about equal in length; first and second segments reddish-brown, paler at base and apex of second segment; third segment black with yellow-brown band at apex; fourth segment black with yellowish apex, the whole segment rather densely clothed with long appressed yellow pubescence. Under surface with basal segments yellowish-brown, remainder black.

Legs reddish-yellow, the extreme bases of the anterior and middle femora and the basal half of posterior femora somewhat darkened, the posterior femora not greatly thickened, but with rather numerous small spines along under surface in apical half.

Wings clear with broad vitta along the anterior margin extending back as far as *vena spuria* to opposite base of median cell; from thence as a more or less straight line to above apex, leaving unshaded the whole of the apical portion of the first basal cell and the dip of R_{4+5} into the first posterior cell.

♀. Similar to male. Front with a broad transverse dark band in the midline forming a laevigate carina, on each side of which is a closely punctate or porose area, the punctures not being continued to eye margin; second and third antennal joints subequal.

Length, 8-10 mm.

Hab.—Queensland: Rockhampton, four males and two females in the collection of the Macleay Museum; Brisbane (12.11.12), a female in the Queensland Museum.

CERIOIDES DODDI, n. sp.

♀. Closely allied to *Cerioides macleayi*. Face yellow, with median vitta broader; vertical sides black, except on lower borders, cheeks yellow with white tomentum; forehead with a transverse black band extending across the forehead behind antennal tubercle; ocellary region black leaving a pair of yellow spots between that and the transverse black band of forehead; antennal tubercle long, dark brown; antennae dark brown, apical joints lighter, first joint but little shorter than the tubercle and twice the length of the second joint, the latter slightly shorter than the third joint, style dark.

Thorax black with yellow humeral angles, a yellow spot on lateral border in front of transverse suture and yellow-brown posterolateral borders; indistinct yellow pubescence along the transverse suture. Scutellum yellow with black band at base; surface of mesonotum and basal portion of scutellum closely granulose. Pleural segments black with yellowish spot on mesopleuron extending on to sternopleuron, but not on to pteropleuron.

Abdomen greatly contracted at base, wasp-like; first segment narrowed to apex; second segment about equal in length to first, narrow at base, widened to apex, narrowest portion of abdomen at junction of two segments, both segments granulose; remaining segments elongate-ovate, much wider; basal segments black with yellow band at apex of second segment; third and fourth segments black with yellow band at apex of each; the two segments about equal in length, the fourth segment with somewhat appressed yellowish pubescence in apical half; fifth segment black; under surface black.

Legs reddish-brown, the knees and basal portions of the tibiae and the extreme apex of the anterior tibiae bright yellow. Tarsi slightly infuscated, specially on the terminal joints. Posterior tibiae not greatly thickened, spinose below in outer half.

Wings clear, with dark brown anterior margin as in *C. macleayi.*

Length, 13 mm., second female, 11 mm.

Hab.—Kuranda, Queensland (Dodd).

While closely allied to *C. macleayi*, the present species differs in the shorter second abdominal segment as well as in details of coloration, etc. Type in S. Australian Museum.

CERIOIDES FACIALIS, n. sp.

♀. Head yellow; ocellary region and vertex stained with brown; front yellow, anterior to ocelli with a broad black transverse band behind and not reaching antennal tubercle, the middle line slightly raised, laevigate, the lateral areas not punctate; face yellow, the median line brownish-yellow, bordered on each side by a dark brown vitta with an outward and somewhat backward extension from middle to orbits, smaller dark patch on each side of antennal tubercle, vertical sides of face with a dark band along upper border; cheeks yellow with brown spot in front, occiput black with a yellow spot above on each side of vertex, antennal tubercle reddish-brown, the apex darker, long, more than twice the length of first antennal segment, the second antennal joint about as long as the first and longer than the third, style dark brown. Mesonotum faintly granulose, black; humeral angles bright yellow, the presutural callus and posterolateral ridge, a small spot to inner side of latter, and a triangular mark in middle of posterior margin also yellow, transverse suture with some short light yellow pubescence. Scutellum yellow, narrowly marked with brown at base and extreme sides. Pleural segments black, a small obscure reddish-brown mark at lower angle of mesopleuron; a bright yellow mark on metapleuron.

Abdomen greatly constricted at base, first segment narrowed from base to apex; second segment longer than first, narrow and subcylindrical at base, thence widened to apex, the remaining segments broad, forming an ovate mass, the third segment longer than the fourth; first segment light reddish-brown with a conspicuous yellow basal border and an indefinite median black mark at apex; second segment yellow on narrow basal portion, thence black with a brownish-yellow apical margin; third and fourth joints black with yellow apical margins; venter mainly black, the basal segment brown with subbasal yellow band, second yellow with blackish apex, the remainder black with narrow yellow apical margins.

Legs reddish-brown, the coxae and basal two-thirds of femora (excepting extreme base), an indistinct submedian band on tibiae and the anterior tarsi (excepting base and apex) darker.

Wings hyaline with dark brown anterior border limited posteriorly by the *vena spuria* as far as base of discal cell, thence by R_{4+5} and including the dip in that vein. Halteres yellow.

Length, 9 mm.

Hab.—N. Queensland: Kuranda (Goldfinch, 21-24 Nov., 1925). A single female presented by the discoverer to the Macleay Museum. The species differs in coloration of face and thorax from all the other species with pedunculate abdomen; the yellow median facial line is quite unusual in Australian species. In the segment with somewhat appressed yellowish pubescence in apical half; fifth segment black; under surface black.

Legs reddish-brown, the knees and basal portions of the tibiae and the extreme apex of the anterior tibiae bright yellow. Tarsi slightly infuscated, specially on the terminal joints. Posterior tibiae not greatly thickened, spinose below in outer half.

Wings clear, with dark brown anterior margin as in *C. macleayi.*

Length, 13 mm., second female, 11 mm.

Hab.—Kuranda, Queensland (Dodd).

While closely allied to *C. macleayi*, the present species differs in the shorter second abdominal segment as well as in details of coloration, etc. Type in S. Australian Museum.

CERIOIDES FACIALIS, n. sp.

♀. Head yellow; ocellary region and vertex stained with brown; front yellow, anterior to ocelli with a broad black transverse band behind and not reaching antennal tubercle, the middle line slightly raised, laevigate, the lateral areas not punctate; face yellow, the median line brownish-yellow, bordered on each side by a dark brown vitta with an outward and somewhat backward extension from middle to orbits, smaller dark patch on each side of antennal tubercle, vertical sides of face with a dark band along upper border; cheeks yellow with brown spot in front, occiput black with a yellow spot above on each side of vertex, antennal tubercle reddish-brown, the apex darker, long, more than twice the length of first antennal segment, the second antennal joint about as long as the first and longer than the third, style dark brown. Mesonotum faintly granulose, black; humeral angles bright yellow, the presutural callus and posterolateral ridge, a small spot to inner side of latter, and a triangular mark in middle of posterior margin also yellow, transverse suture with some short light yellow pubescence. Scutellum yellow, narrowly marked with brown at base and extreme sides. Pleural segments black, a small obscure reddish-brown mark at lower angle of mesopleuron; a bright yellow mark on metapleuron.

Abdomen greatly constricted at base, first segment narrowed from base to apex; second segment longer than first, narrow and subcylindrical at base, thence widened to apex, the remaining segments broad, forming an ovate mass, the third segment longer than the fourth; first segment light reddish-brown with a conspicuous yellow basal border and an indefinite median black mark at apex; second segment yellow on narrow basal portion, thence black with a brownish-yellow apical margin; third and fourth joints black with yellow apical margins; venter mainly black, the basal segment brown with subbasal yellow band, second yellow with blackish apex, the remainder black with narrow yellow apical margins.

Legs reddish-brown, the coxae and basal two-thirds of femora (excepting extreme base), an indistinct submedian band on tibiae and the anterior tarsi (excepting base and apex) darker.

Wings hyaline with dark brown anterior border limited posteriorly by the *vena spuria* as far as base of discal cell, thence by R_{4+5} and including the dip in that vein. Halteres yellow.

Length, 9 mm.

Hab.—N. Queensland: Kuranda (Goldfinch, 21-24 Nov., 1925). A single female presented by the discoverer to the Macleay Museum. The species differs in coloration of face and thorax from all the other species with pedunculate abdomen; the yellow median facial line is quite unusual in Australian species. In the structure of the basal abdominal segments the species is closest to *C. macleayi*, but the apex of the second segment is wider than in that species, also the antennal tubercle is longer and the porose frontal areas are lacking.

CERIOIDES MASTERSI, n. sp.

♀. Head reddish-brown, a round yellow spot on each side of forehead touching eye margin and opposite the antennal tubercle; vertex with a pair of yellow spots behind the ocelli; face with a yellow longitudinal mark on each side of the reddish-brown median vitta practically joined to a similar yellow spot on eye margin, this spot separated from yellow spot on frons by a broad transverse reddish-brown band; another yellow vitta about halfway down vertical sides of face; median line of frons slightly raised in front of ocelli, no punctate areas on frons; antennal tubercle long, yellowish-brown. Antennae yellowish-brown; first joint about half length of tubercle and shorter than the second, the latter longer than the third; apical style white.

Thorax black, finely granulose, humeral angles, and a patch on lateral margin in front of transverse suture yellowish; transverse suture with some yellowish pubescence; the posterolateral margin brown. Scutellum small, with a few scattered granules, yellow with a central apical patch and the lateral margin reddish-brown. Pleural segments black, a small yellow spot present on mesopleuron, not extending on to other segments.

Abdomen contracted at base; first segment short and narrow, slightly narrower at apex than at base; second segment narrower than first at extreme base, but from basal third rapidly widening to apex; remaining segments wide, the third slightly longer than the fourth; first segment black at base, yellow in middle, with a brown apical margin; second segment yellow on contracted portion, otherwise black; third segment black with a broad apical yellow band; fourth segment with narrow apical yellow margin. Venter dark brown, extreme base black, with a yellow margin and a yellow margin on second segment.

Legs yellowish-brown, the anterior and intermediate femora somewhat darker in middle. Posterior femora not thickened, spinose on under surface in apical half.

Wings pale brown with dark brown apical margin, the dark coloration bounded by the *vena spuria* as far as the r-m cross-vein and extending into the dip of R_{4+5}.

Length, 9 mm.

Hab.—South Australia; a single ♀ (K.52025) in Australian Museum collection.

The coloration of the face might be described better as yellow with median vitta, a broad transverse band in front of antennal tubercle, the upper and lower parts of vertical sides reddish-brown. The coloration of the head and the structure of the basal abdominal segments readily distinguish this species from all others. The brown colour of the wings fills the dip in R_{4+5}, thus distinguishing the species from *C. doddi* and *C. macleayi*.

CERIOIDES SUBARMATA Curran and Bryan.

Cerioides subarmata Curran and Bryan, 1926, p. 133.

I am indebted to Mr. Bryan for a paratype of this interesting species. The peculiar features are the separated eyes of the male, the presence of an obtuse tubercle on the under surface of the posterior trochanters and the incrassate hind structure of the basal abdominal segments the species is closest to *C. macleayi*, but the apex of the second segment is wider than in that species, also the antennal tubercle is longer and the porose frontal areas are lacking.

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The species is allied to *C. facialis*, but differs *inter alia* in the facial and thoracic markings, in the shorter antennal pedicle and in the longer second segment. The leg structures are probably sexual, and the ♂ of *facialis* not known.

Hab.—Queensland: Brisbane.

Subfamily ERISTALINAE.

Antennae moderately long, pendent, arista dorsal, bare to plumose. Wings with r-m at or beyond middle of median cell; R_{4+5} with downward loop into first posterior cell (cell R_5); marginal cell (cell R_1) open or closed. Hind femora usually thickened.

The above characterization, which is adapted from Brunetti (1923, p. 154), covers all the known Australian species, with the exception of *Dissoptera pollinosa* Edw. In the latter species r-m is distinctly before the middle of the median cell. While this character would appear to exclude the species from the subfamily, it has been thought advisable, in view of the other venational characters, to follow Edwards and to allow the species to remain in the Eristalinae.

Apart from this species, the Australian members of the subfamily fall into two genera, *Eristalis* and *Helophilus*, though it is possible that the widespread genera *Merodon* and *Mallota* may yet be found to occur. The three Australian genera may be separated as follows:

1. Cell R_1 (marginal cell) open .... *Helophilus*
   Cell R_1 (marginal cell) closed 2
2. r-m at or beyond middle of median cell .... *Eristalis*
   r-m distinctly before middle of median cell .... *Dissoptera*

ERISTALIS.

Eristalis Latreille, 1804, p. 363.

(For synonymy see Brunetti, 1923, p. 155.)

Head as broad as thorax, approximately semicircular; frons only slightly produced, pubescent; face with central knob and moderately produced upper mouth edge; antennae normal, third joint oval with arista dorsal, either quite bare or plumose; eyes usually contiguous in ♂, widely separated in ♀, bare or pubescent, sometimes in part only. Thorax quadrate, densely but often inconspicuously pubescent; scutellum similar clothed. Abdomen about as wide as thorax, ovate or subconical, frequently with markings distinctive of the species, pubescence variable. Legs simple, pubescence variable; hind femora normally not incrassate; hind tibiae usually, but frequently only slightly, curved. Wings with marginal cell closed; R_{4+5} with conspicuous downward loop or dip into first posterior cell which is closed well or just before border by the upward curved tip of M_1; r-m opposite or beyond middle of median cell.

The above diagnosis, which is taken, slightly altered, from Brunetti, covers the Australian species.

The genus is world-wide and various attempts have been made to split it into small genera. The question is ably discussed by Brunetti, who points out that the proposed classification is purely arbitrary, the subgenera embracing femora. The second abdominal segment is longer than in other Australian species. The wings are brownish, but the colour is intensified along the anterior margin as far back as the *vena spuria*, including the whole of the cell anterior to this fold and the basal portion of cell R_5, the dip in R_{4+5} is also included; Cu_1 is also somewhat suffused.

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The genus is world-wide and various attempts have been made to split it into small genera. The question is ably discussed by Brunetti, who points out that the proposed classification is purely arbitrary, the subgenera embracing incongruous species. From a study of the Australian forms I am in agreement with this opinion and do not propose to utilize any of the subgeneric divisions. One name, *Lathyrophthalmus* Mik, has been suggested for the group of species with spotted or irregular marked eyes which are contiguous in the male, and several Australian species, e.g. *punctulatus*, would come into it. This subgenus or genus is separated from *Eristalinus* by the contiguous as against separated eyes in the male, so that unless this sex is known the genus remains uncertain. As in other groups the eyes may be separated or contiguous in the male it does not appear that this character is of even subgeneric importance; similarly it does not seem justifiable to separate groups of such closely allied species as are exemplified by *E. muscoides* and *E. resolutus* merely on the character of the plumose or bare arista. There appears even to be some doubt as to the group to which the name *Eristalis* should be applied.

In Australia the genus *Eristalis* is represented, according to our present knowledge, by some 15 species, of which 8 are apparently confined to the continent and Tasmania, 6 are extralimital, occurring also in Papua or the islands to the north of Australia, and one is an introduced species from Europe. These 15 species are inclusive of two described as new in this paper and four extralimital species herein recorded from Australia. In addition six names have been ascribed to Australian species which must be relegated to synonymy. In dealing with introduced or extralimital species it has not been considered necessary to quote the references or synonymy except in so far as Australian records are concerned. In these cases, however, references are given to other papers where fuller accounts may be found.

Distribution: The extralimital species, which include *arvorum*, *collaris*, *kochi*, *resolutus*, *muscoides* and the new species *kershawi*, are limited in Australia to the northern parts of the continent, while the introduced *E. tenax* is practically universally distributed. Of the eight known endemic species four—*roderi*, *smaragdi*, *maculatus*, *conjunctus*—are known only from Queensland and the Northern Territory, two—*copiosus* and *sinuatus*—from Queensland and New South Wales, and two—*punctulatus* and *pulchellus*—have an extended range from Queensland to Western Australia, including Tasmania.

It is probable that the number of known species will be greatly extended when the fauna of the northern and western portions of Australia is better known.

Life History.—Little or nothing is known of the life history of Australian species, with the exception of the introduced *E. tenax* L.; the larvae of *E. smaragdi* and *E. punctulatus* have, however, been found by Dr. Mackerras in drainage from a hospital at Eidsvold, Queensland, and successfully reared. The larvae had the long siphon characteristic of the species—hence the name rat-tailed larvae. Both species have also been bred by Mr. A. P. Dodd from rotten prickly pear (*Opuntia* sp.).

In the table of species given below the species have been largely grouped by the characters given by de Meijere in his key to the Oriental species of the genus, as these appear to divide the Australian species into fairly natural groups. *E. tenax* stands by itself and is obviously of different type from the native Australian groups, while *E. pulchellus* is also a species with no very close relatives. The main number of the species falls either into the group with black thoracic stripes on a more or less yellow ground or into the group with metallic coloration. A single representative of the species with transverse bands on the thorax—*E. collaris*—is here recorded.

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Table of Species of Eristalis.

1. Nonmetallic species 2
   Species with metallic coloration 8
2. Mesonotum uniformly clothed, without distinct pattern, eyes with two bands of pubescence .... *E. tenax* L.
   Mesonotum not uniformly clothed, pattern of either stripes or bands present, pubescence of eyes not in two bands or eyes bare 3
3. Mesonotum with black stripes 4
   Mesonotum with transverse bands .... *E. collaris* de Meij.
4. Admedian thoracic stripes fused, thorax trivittate .... *E. conjunctus*, n. sp.
   Admedian stripes separate, thorax quadrivittate 5
5. Longitudinal stripes little distinct, facial hump prominent .... *E. kochi* de Meij.
   Longitudinal stripes strongly differentiated against a yellow or grey background; facial hump less prominent 6
6. Abdominal pattern with grey bands and spots .... *E. maculatus* de Meij.
   Abdominal pattern with yellow bands and spots 7
7. Eyes in male with upper facets much larger than lower; thoracic stripes with brown tomentum; upper margin of light band on second segment (♀) not interrupted on each side .... *E. arvorum* F.
   Eyes in male with smaller upper facets, though still somewhat larger than lower facets, thoracic stripes laevigate; upper margin of light band on second segment (♀) interrupted on each side by a dark mark .... *E. punctulatus* Macq.
8. Mesonotum green with a pair of prominent dark spots, eyes separated in ♂ .... *E. pulchellus* Macq.
   Mesonotum metallic coloured with more or less distinct darker stripes; eyes contiguous in ♂ 9
9. Arista plumose 10
   Arista bare 11
10. Pubescence dark; third abdominal segment trivittate .... *E. muscoides* Walk.
    Pubescence light; third abdominal segment trimaculate .... *E. roderi* Berg.
11. Wings shaded brown 12
    Wings clear, glassy 13
12. Large dark blue species (17 mm.) with indistinct thoracic markings .... *E. kershawi*, n. sp.
    Medium-sized species (12 mm.) with distinct thoracic pattern .... *E. resolutus* Walk.
13. Small green species with markings obsolete, venter dark .... *E. smaragdi* Walk.
    Medium-sized species with yellow venter 14
14. Abdomen metallic green with yellow side-spots on second and third segments (♂), or on second segment (♀) .... *E. sinuatus* Thoms.
    Abdomen with central tawny stripe .... *E. copiosus* Walk.

ERISTALIS TENAX L.

Musca tenax Linnaeus, 1758, p. 591.—*Eristalis tenax* de Meijere, 1908, p. 244; Hardy, 1921, p. 16. (For synonymy see Brunetti, 1923, p. 173).

Widely distributed throughout Australia, this well known introduced species requires no description. It cannot well be confused with any indigenous species, though the species herein recorded as *E. kochi* de Meijere has a certain superficial resemblance; the bare eyes in the latter species will at once separate it.

ERISTALIS COLLARIS de Meij.

E. collaris, de Meijere, 1907, p. 258.

A single male from Claudie River, N. Queensland, in the National Museum, Melbourne, agrees well with de Meijere's description, except that the light transverse thoracic band is broadly, though somewhat indistinctly, interrupted in the middle line.

Two females from Lizard Is. in the Macleay Museum also appear to belong here; one agrees well with the description; in the other the central facial vitta is more black than "rotgelber"; a third female in the Health Department collection from Port Moresby, New Guinea, has the facial vitta decidedly black with a faint

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8.	Mesonotum green with a pair of prominent dark spots, eyes separated in ♂	*E. pulchellus* Macq.
	Mesonotum metallic coloured with more or less distinct darker stripes; eyes contiguous in ♂	9
9.	Arista plumose	10
	Arista bare	11
10.	Pubescence dark; third abdominal segment trivittate	*E. muscoides* Walk.
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Hab.—New Guinea (de Meijere); Queensland: Claudie R., Lizard Island.

ERISTALIS CONJUNCTUS, n. sp.

A short, rather convex, species, yellow, with three dark longitudinal stripes on mesonotum.

Head transverse, about as wide as mesonotum. Eyes closely contiguous for a considerable distance; vertex dark brown with light brown hairs, ocelli prominent, yellow; frontal triangle somewhat produced, reddish-brown with greyish pubescence, the short narrow parafrontals with greyish-yellow tomentum; face with tubercle obtuse, not markedly prominent, median vitta brown, laevigate, light yellow-brown in centre, darker on each side; sides with dense greyish-yellow tomentum, lower border broadly laevigate, yellow-brown; cheeks brownish-yellow with grey pubescence; posterior margins with yellow tomentum below, becoming darker above; antennae brown, third joint with darker upper margin, and longer than wide, arista bare; eyes bare, with larger facets above, the transition between the two kinds of facets abrupt and the difference in size considerable. Mesonotum densely clothed with bright yellow tomentum, with three longitudinal black vittae, the median vitta broader and apparently composed of two closely approximated stripes, an indication of a narrow median grey line being present; in the posterior third this vitta becomes yellow-brown, extending as such to scutellum, lateral vittae hardly interrupted by the transverse suture which is clothed with yellow-brown tomentum, the portion of the vitta posterior to the suture narrowed behind and ending in a long point; a small transverse mark in transverse suture external to lateral vitta black; humeri and supra-alar region yellow-brown, posterolateral ridge dark brown. Scutellum yellow, darker and more brownish at base, pubescence short, dark yellow along free margin. Sides yellow-brown above, dark brown below, with an oblique grey tomentose band from mesopleuron to posterior portion of sternopleuron. Abdomen golden yellow, the first with darker median mark at base, the second with apex darker yellow-brown, this colour extending forward slightly in mid-line, a pair of lighter yellow tomentose spots on each side of mid-line; third and fourth segments with three darker yellow-brown vittae extending full length of these segments, the space between the median and sublateral vittae on each side with bright gold tomentum. Venter yellow. Legs brownish-yellow, the tarsi darker. Wings clear. Venter normal; calypters yellow with golden fringe. Halteres yellow.

Length, 7 mm.

Hab.—Queensland. A single ♂ in the Macleay Museum collection.

In a second male from South Palm Island, the colours generally are darker, the median vitta is practically black throughout, the scutellum is darker brown and the pleural segments practically black, except on pteropleuron and those portions of meso- and sternopleura which are grey tomentose; the transverse banding of second segment and the three longitudinal vittae on third and fourth segments are much darker and very conspicuous.

In the single female before me (Claudie R., Queensland, J. A. Kershaw 11-12. 2. 1913) the colours are as in the Palm Island male; the front is black, clothed with dense golden-brown tomentum with a band of black tomentum in front of ocelli; the antennal prominence is black with greenish reflections and the lunula brown.

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ERISTALIS CONJUNCTUS, n. sp.

A short, rather convex, species, yellow, with three dark longitudinal stripes on mesonotum.

Head transverse, about as wide as mesonotum. Eyes closely contiguous for a considerable distance; vertex dark brown with light brown hairs, ocelli prominent, yellow; frontal triangle somewhat produced, reddish-brown with greyish pubescence, the short narrow parafrontals with greyish-yellow tomentum; face with tubercle obtuse, not markedly prominent, median vitta brown, laevigate, light yellow-brown in centre, darker on each side; sides with dense greyish-yellow tomentum, lower border broadly laevigate, yellow-brown; cheeks brownish-yellow with grey pubescence; posterior margins with yellow tomentum below, becoming darker above; antennae brown, third joint with darker upper margin, and longer than wide, arista bare; eyes bare, with larger facets above, the transition between the two kinds of facets abrupt and the difference in size considerable. Mesonotum densely clothed with bright yellow tomentum, with three longitudinal black vittae, the median vitta broader and apparently composed of two closely approximated stripes, an indication of a narrow median grey line being present; in the posterior third this vitta becomes yellow-brown, extending as such to scutellum, lateral vittae hardly interrupted by the transverse suture which is clothed with yellow-brown tomentum, the portion of the vitta posterior to the suture narrowed behind and ending in a long point; a small transverse mark in transverse suture external to lateral vitta black; humeri and supra-alar region yellow-brown, posterolateral ridge dark brown. Scutellum yellow, darker and more brownish at base, pubescence short, dark yellow along free margin. Sides yellow-brown above, dark brown below, with an oblique grey tomentose band from mesopleuron to posterior portion of sternopleuron. Abdomen golden yellow, the first with darker median mark at base, the second with apex darker yellow-brown, this colour extending forward slightly in mid-line, a pair of lighter yellow tomentose spots on each side of mid-line; third and fourth segments with three darker yellow-brown vittae extending full length of these segments, the space between the median and sublateral vittae on each side with bright gold tomentum. Venter yellow. Legs brownish-yellow, the tarsi darker. Wings clear. Venter normal; calypters yellow with golden fringe. Halteres yellow.

Length, 7 mm.

Hab.—Queensland. A single ♂ in the Macleay Museum collection.

In a second male from South Palm Island, the colours generally are darker, the median vitta is practically black throughout, the scutellum is darker brown and the pleural segments practically black, except on pteropleuron and those portions of meso- and sternopleura which are grey tomentose; the transverse banding of second segment and the three longitudinal vittae on third and fourth segments are much darker and very conspicuous.

In the single female before me (Claudie R., Queensland, J. A. Kershaw 11-12. 2. 1913) the colours are as in the Palm Island male; the front is black, clothed with dense golden-brown tomentum with a band of black tomentum in front of ocelli; the antennal prominence is black with greenish reflections and the lunula brown.

Since the above was written I have seen another female in the Queensland Museum from Cairns (A. P. Dodd); this has the colours as in the Palm Island male and the abdominal vittae are well marked. It is probable that the type may be somewhat faded.

ERISTALIS KOCHI de Meijere.

Eristalis kochi de Meijere, 1908, p. 255.

A male in the collection of the New South Wales Department of Health from the Northern Territory and one in the Queensland Museum from Brisbane agree well with de Meijere's description of *E. kochi* and, until evidence to the contrary is forthcoming, should, I think, be referred to de Meijere's species.

At first sight the species resembles *E. tenax*, but the eyes are bare and the thorax is vittate, though the vittae are not so sharply marked off from the ground colour as in other vittate species.

Hab.—New Guinea (de Meijere); Australia, Northern Territory: Katherine River (H. W. Brown); Queensland: Brisbane (H. Hacker, 12.2.18).

ERISTALIS ARVORUM F.

E. arvorum Fabricius, 1787, p. 335.

(For synonymy see Brunetti, 1923, p. 181.)

This species is recorded from Australia by Curran and Bryan (1926, p. 129), the record being based on a specimen from Babinda, North Queensland. There are before me a series of specimens from N. Queensland which are certainly distinct from *E. punctulatus* and which may be *E. arvorum.* I am, however, not satisfied of the identity of the specimens.

In all the specimens the legs are quite pale, a feature characteristic of *E. arvorum,* but the abdominal markings, particularly in the female, differ very much from the figures of this species given by Brunetti (1923, Pl. iv, fig. 6, 7). The description given by this author (pp. 181-3), however, is much more in agreement with the markings found on the Australian specimens. It would appear both from Brunetti's and from de Meijere's descriptions that the abdominal pattern is but little different in the two sexes, though according to Brunetti it may vary considerably in both sexes. This variation would practically cover the markings of both sexes of the Australian form, but in the Australian specimen the pattern is fixed and different in each sex. *E. arvorum* is an Oriental species whose range is from China to India and Java; I have seen no record from Papua, and one would expect intermediate records.

It is to be noted that de Meijere (1908, p. 265) expressed the opinion that *E. punctulatus* was closely allied to *E. suavissimus* Walker, and the Australian specimens agree well with de Meijere's description and figure (1908, Pl. 8, fig. 26), except in so far as the femora are darker in *suavissimus.* Until authentic specimens of *arvorum* are available for comparison, the question of the identity of the Australian specimen must remain open.

E. fulvipes Macq. (1846, p. 128) is placed by Brunetti as a synonym of *arvorum,* following Austen who examined the presumable type in the Verrall collection. This identification is in favour of the North Queensland specimens being *E. arvorum,* since *E. fulvipes* was described from Australia. But for Austen's identification I should have been tempted to regard *E. fulvipes* as founded on a discoloured specimen of *E. punctulatus.*

The Queensland specimens are from the following localities: Claudie River (4 ♂), Kuranda (♀), Great Palm Island (♀). It will be noted that the males

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ERISTALIS PUNCTULATUS Macq.

Eristalis punctulatus Macquart, 1846, p. 59; 1850, p. 137; de Meijere, 1908, p. 265, Pl 8, fig. 26; Hardy, 1921, p. 16.—*E. agno*, Walker, 1849, p. 626; Klocker, 1924, p. 57.—*E. epitome*, Walker, 1852, p. 250.

Hardy (1921) has recorded the above synonymy; Klocker regards *agno* Walk. as distinct, but a specimen in the Queensland Museum identified by Klocker as *E. agno* is stated by Hardy (*in litt.*) to be merely the male of *E. punctulatus*. There is nothing in the original description of *E. agno* to differentiate it from *E. punctulatus*. I have, however, not had an opportunity of comparing Western Australian specimens with specimens from the eastern side of the continent.

E. punctulatus is readily distinguished from the species identified as *E. arvorum* by the upper facets of the eyes of male being only slightly larger than the lower facets and much smaller than the corresponding facets in that species. In the female the pattern of the second abdominal segment is distinctive, the broad light bands are well separated in the middle line and reach the anterior margin at each end of the band, but show a dip away from the border in the middle of the band.

This species has been bred from rat-tailed larvae found in drainage from the local hospital at Eidsvold, Queensland (Dr. I. M. Mackerras). Mr. A. P. Dodd informs me that he has bred it also from rotting prickly pear (*Opuntia* sp.).

ERISTALIS MACULATUS de Meijere.

Eristalis maculatus de Meijere, 1908, p. 266, Pl. 8, fig. 25.—*Eristalis herve-bazini* Klocker, 1924, p. 58, Pl. 10, fig. 3.

Specimens from Brisbane and elsewhere in Queensland and the Northern Territory agree closely with the description and figure of *E. herve-bazini* Klocker. They also agree fairly well with the description of *E. maculatus* de Meijere except that the outer ends of the white bands on the second abdominal segment are not so sharply demarcated as shown in de Meijere's figure, but merge into the light areas on the sides of the segment. De Meijere hints that *maculatus*, as well as *punctulatus*, may be merely a race of *E. suavissimus*.

Hardy is of opinion (private communication) that *herve-bazini* was founded on a greasy specimen of *E. punctulatus*, but the specimen in the Queensland Museum examined by Hardy is not the type and is not identical with the specimens in the Departmental collection which do agree with Klocker's description and figure. It is to be noted that the types of the new species of Syrphidae described by Klocker were not returned to the Queensland Museum.

I regard the synonymy given above as probably correct and the species as a good one, readily separated from *punctulatus* in colour and pattern.

ERISTALIS PULCHELLUS Macq.

Eristalis pulchellus Macquart, 1846, p. 127; Hardy, 1921, p. 16.—*Eristalis aebutius* Walker, 1849, p. 630.

A very distinct and easily recognized species, not closely related to other Australian forms, and with a wide range over the southern part of the continent. The above synonymy has already been recorded by Hardy (1921, p. 16).

Macquart's description is much more accurate than Walker's description of *E. aebutius*, and it might even be questioned if the species were not distinct, but and females are from different localities, which renders less certain their specific identity. They, however, differ from each other as do the sexes of *E. punctulatus*.

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As the ♂ does not appear to have been described a description is here given.

♂. Head clothed as in ♀, eyes separated by a little more than one-third the width of an eye, bare, finely faceted; forehead bluish-black posteriorly with dense black pubescence, parallel-sided, yellow anteriorly with yellow pubescence and produced forwards, the sides diverging; face perpendicular for short distance below antennae, thence produced forwards into the prominent facial hump, beneath the latter the face retreating to oral margin which is somewhat produced above, pubescence yellow; cheeks rather broad, white tomentose, with grey hairs; occipital margin with white tomentum; antennae bright reddish-yellow, third joint ovate, arista bare, brown. Mesonotum brassy-green with faint indications of darker admedian lines in anterior portion and with a prominent black, tomentose, spot on each side at inner end of suture, pubescence yellow. Scutellum deep violet, with purple reflections. Pleural segments brassy-green with long golden pubescence. Abdomen in middle bright bluish-green, first segment bluish-black, second segment with a dark bluish apical margin produced in mid-line, leaving a small greenish spot at extreme apex, third segment with a subbasal and median spot and a larger apicolateral spot dark bluish-black; fourth segment with three similar but smaller and more rounded spots, the median one reaching the basal border. Legs yellowish, the basal half of anterior and middle femora and the basal two-thirds of hind femora brassy-green, the apical third of hind femora deep violet, anterior tibiae slightly infuscated in apical third, the hind tibiae more conspicuously so, tarsi black. Wings clear, venation normal. In the female the eyes are farther apart and the sides of the front strongly divergent.

Length, 11 mm.

Hab.—Queensland to Western Australia and Tasmania. The species is rare in New South Wales and the only Queensland specimens I have seen are those in the Macleay Museum noted by Hardy. It appears to be common in Victoria, South Australia and Western Australia.

ERISTALIS MUSCOIDES Walker.

Eristalis muscoides Walker, 1859, p. 96; de Meijere, 1908, pp. 270-6.

Two specimens are before me from Koolpinyah, N. Territory (G. F. Hill) labelled *E. muscoides* Walk., id. at British Museum. While undoubtedly closely allied, I believe the two specimens to represent two species, the male agreeing well with de Meijere's notes on Walker's species and the female with Bergroth's description of *E. roderi*. I was inclined at first to consider the differences sexual, but Mr. Hill has sent me both sexes of *E. roderi* from Townsville and the same differences are apparent between the males of the two species as between the Koolpinyah male and female. While the difference in part hinges on the abdominal pattern and de Meijere notes that this may vary in *E. muscoides*, the variation being in the direction of shortening of the sublateral vittae on the third abdominal segment, the other differences are too marked to allow me to consider the species as other than distinct.

Hab.—Aru, Ambou; New Guinea; Australia, N. Territory: Koolpinyah (G. F. Hill).

Var.—Three specimens (♂) from North Queensland differ from the Northern Territory male in their deep blue coloration with purple and violet reflections. In two males from Gordonvale the scutellum is reddish with purple reflections, while in a male from Meringa the scutellum is deep blue. There does not seem for the fact that there is a typical specimen of *E. pulchellus* in the National Museum, Melbourne, which was identified by Miss Ricardo as *E. aebutius*.

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ERISTALIS RODERI Bergroth.

Eristalis roderi, Bergroth, 1894, p. 72.

Though closely allied to *E. muscoides*, this species may be distinguished by its generally lighter pale blue coloration and by the frontal triangle in the ♂ densely yellowish-white tomentose and pubescent, and not metallic green with black hairs; by the narrower median thoracic vitta broadening behind suture, the rest of the broad vitta of *E. muscoides* being very indistinctly indicated; by the vittae of the third and fourth abdominal segments being represented by short spots, the median near anterior, the sublateral at posterior margin; and by the general pale yellowish pubescence.

Hab.—Queensland: Coomooboolaroo (Bergroth), Townsville (G. F. Hill); N. Territory: Koolpinyah (G. F. Hill).

ERISTALIS KERSHAWI, n. sp.

A large metallic-blue species with dark wings.

♂. Head large, hemispherical. Eyes contiguous for a considerable distance, ocellary triangle raised, metallic-blue, the ocelli reddish-brown, hairs on vertex black; frontal triangle rather strongly produced, metallic-blue with violet reflections, with black hairs more conspicuous in upper part; parafrontals narrowly grey tomentose, the grey fading away above; face concave beneath antennae, produced to an obtuse tubercle, thence falling vertically to oral margin, middle broadly blue with violet reflections, the sides grey tomentose, lower border black; cheeks narrow, black, grey tomentose, posterior margin grey tomentose with rather long grey pubescence; eyes bare, with somewhat larger facets above, no sharp line of demarcation between the larger and smaller facets. Antennae dark brown, the third joint black, rather short; arista long, dark brown, bare. Mesonotum dark metallic-blue with indistinct markings; a patch of grey tomentum at inner side of base of humeral angle and a second patch internal to this, the transverse suture also grey tomentose; seen from side a pair of dark grey tomentose stripes are present in mid-line from anterior margin to middle, separated by a darker almost black line; an indistinct elongate triangular black mark behind transverse suture; pubescence black. Scutellum deep blue with violet iridescence, pubescence short, black. Pleural segments dark blue, somewhat dull and becoming brownish anteriorly and on hypopleuron, the latter grey tomentose; pubescence pale on sternopleuron and upper part of mesopleuron, elsewhere dark. Abdomen dark blue with greenish reflections, the third segment with a broad patch of reddish-yellow at sides extending as a narrow band along apical border; fourth segment mainly reddish-brown with a broad ill-defined purple iridescent patch at base; genital segments dark brown. Venter black with green and purple iridescence, the membranous connections between tergites and sternites and between the sternites bright golden-yellow.

Legs dark, with purple and violet iridescence, the anterior and intermediate tibiae reddish-brown, tarsi also dark reddish-brown; anterior femora with grey to be any structural difference between these three specimens and the Northern Territory specimen identified as *E. muscoides*, and the pattern is identical. Further specimens may yet prove this form to be a distinct species, but it would be unwise in the present state of our knowledge to separate it. The three specimens approach the description of *E. cupreus* de Meij., but the hairs are certainly not "fahlgelb", an indication that they do not belong to de Meijere's species.

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♂. Head large, hemispherical. Eyes contiguous for a considerable distance, ocellary triangle raised, metallic-blue, the ocelli reddish-brown, hairs on vertex black; frontal triangle rather strongly produced, metallic-blue with violet reflections, with black hairs more conspicuous in upper part; parafrontals narrowly grey tomentose, the grey fading away above; face concave beneath antennae, produced to an obtuse tubercle, thence falling vertically to oral margin, middle broadly blue with violet reflections, the sides grey tomentose, lower border black; cheeks narrow, black, grey tomentose, posterior margin grey tomentose with rather long grey pubescence; eyes bare, with somewhat larger facets above, no sharp line of demarcation between the larger and smaller facets. Antennae dark brown, the third joint black, rather short; arista long, dark brown, bare. Mesonotum dark metallic-blue with indistinct markings; a patch of grey tomentum at inner side of base of humeral angle and a second patch internal to this, the transverse suture also grey tomentose; seen from side a pair of dark grey tomentose stripes are present in mid-line from anterior margin to middle, separated by a darker almost black line; an indistinct elongate triangular black mark behind transverse suture; pubescence black. Scutellum deep blue with violet iridescence, pubescence short, black. Pleural segments dark blue, somewhat dull and becoming brownish anteriorly and on hypopleuron, the latter grey tomentose; pubescence pale on sternopleuron and upper part of mesopleuron, elsewhere dark. Abdomen dark blue with greenish reflections, the third segment with a broad patch of reddish-yellow at sides extending as a narrow band along apical border; fourth segment mainly reddish-brown with a broad ill-defined purple iridescent patch at base; genital segments dark brown. Venter black with green and purple iridescence, the membranous connections between tergites and sternites and between the sternites bright golden-yellow.

Legs dark, with purple and violet iridescence, the anterior and intermediate tibiae reddish-brown, tarsi also dark reddish-brown; anterior femora with grey pubescence along posterior surface, intermediate femora with moderately long grey pubescence at base, the pubescence elsewhere dark.

Wings dark brown, somewhat lighter along posterior edge, venation normal. Calypters black with yellow fringe along margin of lower calypter; halteres yellow.

Length, 17 mm.

Hab.—Queensland: Claudie R. (J. A. Kershaw, 11-12. 2. 1913).

This handsome species is quite unlike any known Australian form and is probably of Papuan origin. I cannot find, however, that it has been described from New Guinea or the East Indian Islands. Two males and a female in the Australian Museum from the Fly and Oriomo Rivers, Papua, appear to belong here, the only difference being the somewhat larger size (22 mm.).

In de Meijere's key to the Oriental species, the present one would apparently fall into the same division as *E. resolutus* and *E. fenestratus*, though the thoracic pattern is almost obsolete. From these two species it differs in its much larger size and in coloration.

ERISTALIS RESOLUTUS Walker.

Eristalis resolutus, Walker, 1859, pp. 95, 129.

A pair from Kuranda agree closely with de Meijere's notes on this species and also with Walker's original description. The species belongs to the *E. smaragdi* group, but differs from *E. smaragdi* in its larger size and purplish, not green, colour; the arista is bare.

Hab.—Aru Islands; Key Islands; Sula; New Guinea; Australia, N. Queensland: Kuranda (Dodd).

ERISTALIS SMARAGDI Walker.

Eristalis smaragdi Walker, 1849, p. 361.

A small metallic-green species with golden and coppery reflections; the thoracic markings seen in other metallic species are obsolete, there being only faint evidence of tomentose admedian stripes before the suture. The abdomen is likewise almost concolorous, but faint indications of darker markings are seen along the anterior and posterior margins of second segment, as a median vitta on same segment and in male as three vittae on third segment, in female as a single vitta. The arista is bare.

The male has not been described and hardly differs from the female except in the contiguous eyes, the upper facets of which are not appreciably larger than the lower, and in the slightly more evident abdominal pattern.

Dr. I. Mackerras has bred the species from rat-tailed larvae found in sewage from the hospital at Eidsvold, Queensland. Mr. A. P. Dodd has also bred this species from rotting prickly pear (*Opuntia* sp.). *E. smaragdi* has a wide range in tropical Australia; specimens are before me from Darwin, Northern Territory, Kuranda and Eidsvold, Queensland.

ERISTALIS SINUATUS Thoms.

Eristalis decorus Macquart, 1848, p. 41, Pl. 4, fig. 4; Schiner, 1868, p. 362; Hardy, 1921, p. 16 (nom. praeocc.).—*Eristalis sinuatus* Thomson, 1868, p. 488.

A metallic blue-green species with bright yellow head, legs and venter. The thoracic markings are similar to those present in *E. muscoides* and *E. resolutus*, but are somewhat obscure. In the female the yellow markings are confined to the second abdominal segment, while in the male the yellow is more extensive and pubescence along posterior surface, intermediate femora with moderately long grey pubescence at base, the pubescence elsewhere dark.

Wings dark brown, somewhat lighter along posterior edge, venation normal. Calypters black with yellow fringe along margin of lower calypter; halteres yellow.

Length, 17 mm.

Hab.—Queensland: Claudie R. (J. A. Kershaw, 11-12. 2. 1913).

This handsome species is quite unlike any known Australian form and is probably of Papuan origin. I cannot find, however, that it has been described from New Guinea or the East Indian Islands. Two males and a female in the Australian Museum from the Fly and Oriomo Rivers, Papua, appear to belong here, the only difference being the somewhat larger size (22 mm.).

In de Meijere's key to the Oriental species, the present one would apparently fall into the same division as *E. resolutus* and *E. fenestratus*, though the thoracic pattern is almost obsolete. From these two species it differs in its much larger size and in coloration.

ERISTALIS RESOLUTUS Walker.

Eristalis resolutus, Walker, 1859, pp. 95, 129.

A pair from Kuranda agree closely with de Meijere's notes on this species and also with Walker's original description. The species belongs to the *E. smaragdi* group, but differs from *E. smaragdi* in its larger size and purplish, not green, colour; the arista is bare.

Hab.—Aru Islands; Key Islands; Sula; New Guinea; Australia, N. Queensland: Kuranda (Dodd).

ERISTALIS SMARAGDI Walker.

Eristalis smaragdi Walker, 1849, p. 361.

A small metallic-green species with golden and coppery reflections; the thoracic markings seen in other metallic species are obsolete, there being only faint evidence of tomentose admedian stripes before the suture. The abdomen is likewise almost concolorous, but faint indications of darker markings are seen along the anterior and posterior margins of second segment, as a median vitta on same segment and in male as three vittae on third segment, in female as a single vitta. The arista is bare.

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A metallic blue-green species with bright yellow head, legs and venter. The thoracic markings are similar to those present in *E. muscoides* and *E. resolutus*, but are somewhat obscure. In the female the yellow markings are confined to the second abdominal segment, while in the male the yellow is more extensive and is present on the sides of the third segment. Eyes bare, holoptic in male, the upper facets hardly larger than the lower. Antennae with bare arista.

The above synonymy is recorded by Hardy and appears to be undoubtedly correct. Hardy, however, overlooked the fact that the name *decorus* had been used by Perty* prior to Macquart.

The species is widely distributed along the Eastern Coast. Specimens before me were taken at Dinner Creek, Ravenshoe, N. Queensland, while the species is common at Sydney. Specimens may frequently be taken on flowers, particularly those of *Angophora cordifolia*. Nothing appears to be known of the life history.

ERISTALIS COPIOSUS Walker.

Eristalis copiosus Walker, 1852, p. 249; Klocker, 1924, p. 57.

Described from an unknown locality, Klocker has recorded this species from Brisbane.

The species is unknown to me, and it is not represented in any Sydney collection, though readily recognizable from the yellow median abdominal stripe. The remainder of the description suggests that the species is probably allied to *E. sinuatus* Thoms.

It is possible that the species is actually founded on the male of *E. sinuatus* Thoms. The original description of the abdomen is as follows: "Abdomen . . . . with a broad tawny stripe from the base till near the tip which is blue, and has near it an almost annular brassy green mark; underside tawny".

In *E. sinuatus* Thoms. there is a tawny vitta *on each side*, the median line being dark. Unless, therefore, there is an error in the original description the species must be distinct.

HELOPHILUS.

Helophilus Meigen, 1922, p. 368.—*Orthoprosopa* Macq., 1850, p. 143.

(For other synonymy and references see Brunetti, 1923, pp. 204-5.)

Resembles *Eristalis*, but differs in the marginal cell (cell R_5) being open. Eyes always bare, separated or contiguous for only a short distance in ♂, always widely separated in ♀; arista always bare; posterior femora thickened, posterior tibiae curved.

The open marginal cell mainly distinguishes this genus from *Eristalis*. Brunetti states that the eyes in the male are always narrowly but distinctly separated, but admits species in which the eyes are contiguous, though only for a short distance.

Hardy (1921, p. 15) apparently relies on the contiguous eyes for separating *Orthoprosopa* from *Helophilus*, but the eyes are no different in the genotype of *Orthoprosopa* from those of such species as *Helophilus hilaris* and *H. bengalensis*.

In the New Zealand species, such as *H. trilineatus* F., the eyes are widely separated in the male and the facial structure is different from that in *Orthoprosopa*. In *O. grisea* the face descends at first with a slight concavity, thence straight from the base of antennae to the oral margin; this is also the case in *H. hilaris* and *H. bengalensis*, except that the lower portion of the front is subcarinate. In the New Zealand species and also in the new species described herein as *H. terrae-reginae* the concavity is more pronounced and below it the face is produced into a prominent knob or hump. *H. terrae-reginae*, however, differs from the New Zealand species in the eyes being contiguous for a short

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* Kertesz Catalogue gives the reference as follows: "*decora* Perty. Delect. animal artic. Brasil, 185 Tab. xxxvii, fig. 3 (1830-34)".

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De Meijere in most cases makes no mention of a central hump, and in the description of *H. scutatus* he says: "Unter gesicht . . . . ohne Andeutung eines Hockers". Only in the case of *H. fulvus*—which in coloration is very close to my *terrae-reginae*—does he describe the hump as present—"der Hocker also stark vortretend, gross, gerundet, glanzend schwarz".

It would thus appear possible to divide at least the Australian species into two groups, on the facial structure, but I doubt if the division can be considered sufficiently distinct to warrant their separation into genera or even subgenera.

Distribution.—One species, *H. bengalensis*, is extralimital, the range including the northern portion of Australia as far south as the Richmond River in New South Wales. Two others, *H. hilaris* Walk. and *H. terrae-reginae*, n. sp., are only known from Queensland. *H. ruficauda* Bigot is merely described from Australia. The remaining described species, *H. griseus* Walk., is apparently restricted to New South Wales, Macquart's record from Tasmania being in all probability erroneous*. As noted above an undescribed species occurs in South Australia.

Life History.—But little is known of the life history of the Australian species of *Helophilus*. Brunetti says of the genus (1923, p. 205) that the larva lives in stagnant water and is not readily distinguishable from that of *Eristalis*. In *H. griseus* Walk. the larvae live in the fluid slime found between the outer shell and the core in rotting grass-tree (*Xanthorrhoea*) stumps and have been described by Skuse and by Froggatt. They are noteworthy in possessing very short, straight anal tubes.

Table of Species of Helophilus.

1. Face with pronounced median hump. (General coloration bright orange-yellow with narrow incomplete thoracic vittae) .... *H. terrae-reginae*, n. sp.
   Face without pronounced median hump 2
2. General coloration black, with yellow face .... *H. griseus* Walk.
   General coloration yellow and black, mesonotum with three conspicuous black vittae 3
3. Intermediate femora in ♂ with basal tooth and subapical emargination and tooth; third segment in ♀ mainly orange with black posterior margin .... *H. bengalensis* Wied.
   Intermediate femora with only basal tooth, apex not emarginate nor toothed; third segment in ♀ mainly dark with yellow lateral marks .... *H. hilaris* Walk.

Note.—*H. ruficauda* Bigot is omitted from this table, as the description is insufficient to enable me to place it in the tabulation.

HELOPHILUS TERRAE-REGINAE, n. sp.

A large fulvous yellow species with four incomplete black dorsal vittae on thorax and an interrupted median vitta on abdomen.

♂. Eyes briefly contiguous, ocellary triangle dark brown with a little yellow tomentum; frontal triangle densely clothed with pale yellow tomentum, the apex of the antennal tubercle bare, dark brown and shining; face clothed with similar tomentum, the median line bare, black, the central knob prominent, black and shining, the lower portion of the sides of snout also black and shining; cheeks distance in the male. In an undescribed species from South Australia, a single damaged male of which is before me, a conspicuous facial bump is present and the eyes are barely touching at one point. Brunetti, in his description of the Indian species, does not mention the facial hump, except in the case of *H. bengalensis*, when he says "central bump small".

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narrow, clothed with pale yellow tomentum, as is also occipital region; pubescence on head bright yellow, with a few dark hairs about ocelli; antennae bright reddish-yellow, arista bare. Mesonotum densely clothed with golden-yellow tomentum, with two median black lines slightly nearer each other anteriorly and extending from apical margin to halfway between suture and scutellum, the intervening space wider than either line; also with an interrupted sublateral vitta on each side, the portion in front of the suture subovate, the portion behind narrowed and drawn out into a long point, pubescence of a deep golden colour thicker and deeper in colour at sides. Scutellum entirely deep golden, not covered with tomentum but clothed with long deep golden pubescence. Pleural segments clothed with yellow or yellowish-grey tomentum, pubescence bright golden. Abdomen densely clothed with bright golden tomentum and with golden pubescence, the base of second segment with a transverse black band, not reaching the sides and extended in mid-line to form a longitudinal vitta broken in apical third of segment, but continued on third segment for little over half the length of the segment and barely indicated as a narrow line on basal half of fourth segment; genital segments half rotated. Venter in basal portion black with pale segmentations, the apical portion reddish-brown to golden at apex. Coxae, trochanters and femora black, the extreme apex of the latter yellow, tibiae and tarsi bright reddish-yellow; pubescence golden except on under surface at apex of posterior femora; posterior femora greatly thickened, deep from above downwards, the dorsal surface strongly declivous near apex, ventral surface gradually expanded towards base on posterior border, the surface flattened; posterior tibiae bowed, the ventral surface bisinuate with a blunt tooth situated slightly to the base of the middle of the tibiae. Wings clear, slightly suffused with brown along cross-veins; venation as in genus. Calypters yellow with yellow fringe. Halteres yellow.

Length, ♂. 14 mm.

Hab.—Cairns District (F. P. Dodd). Type in South Australian Museum.

Described from a single ♂; the species must be remarkably close to *H. fulvus* de Meij. described from New Guinea, in the thoracic and abdominal ornamentation, but the legs are described in that species as quite black, and there is no mention of the great thickening of the posterior femora, from which I infer that the legs are simple in *H. fulvus*.

In the pronounced facial knob the species differs from other described Australian species and approaches the forms found in New Zeland; the eyes are, however, contiguous for about one-sixth of the distance from vertex to frons, not widely separated.

HELOPHILUS GRISEUS Walker.

Helophilus griseus Walker, 1835, p. 472; Froggatt, 1907, p. 303; Klocker, 1924, p. 59.—*Meredon contrarius* Walker, 1849, p. 599.—*Orthoprosopa nigra* Macquart, 1849, p. 153, Pl. xiii, fig. 5; Skuse, 1888, p. 423 (larvae); Froggatt, 1896, p. 83, Pl. ix, fig. 6-8.—*O. binotata* Thomson, 1869, p. 492.—*O. grisea* Hardy, 1921, p. 16.

A medium-sized black species with reddish-yellow face clothed with bright golden tomentum, reddish-yellow antennae, a pair of black tomentose spots on the mesonotum at inner end of suture, white tomentose spots at base of second, third and fourth abdominal segments, black legs and tarsi with golden pulvilli and bases of claws, and smoky-grey wings. Eyes bare, contiguous in male for about one-seventh of distance from vertex to apex of front, facets equal. Arista bare. The face is gently and evenly concave from below antennae to oral margin which narrow, clothed with pale yellow tomentum, as is also occipital region; pubescence on head bright yellow, with a few dark hairs about ocelli; antennae bright reddish-yellow, arista bare. Mesonotum densely clothed with golden-yellow tomentum, with two median black lines slightly nearer each other anteriorly and extending from apical margin to halfway between suture and scutellum, the intervening space wider than either line; also with an interrupted sublateral vitta on each side, the portion in front of the suture subovate, the portion behind narrowed and drawn out into a long point, pubescence of a deep golden colour thicker and deeper in colour at sides. Scutellum entirely deep golden, not covered with tomentum but clothed with long deep golden pubescence. Pleural segments clothed with yellow or yellowish-grey tomentum, pubescence bright golden. Abdomen densely clothed with bright golden tomentum and with golden pubescence, the base of second segment with a transverse black band, not reaching the sides and extended in mid-line to form a longitudinal vitta broken in apical third of segment, but continued on third segment for little over half the length of the segment and barely indicated as a narrow line on basal half of fourth segment; genital segments half rotated. Venter in basal portion black with pale segmentations, the apical portion reddish-brown to golden at apex. Coxae, trochanters and femora black, the extreme apex of the latter yellow, tibiae and tarsi bright reddish-yellow; pubescence golden except on under surface at apex of posterior femora; posterior femora greatly thickened, deep from above downwards, the dorsal surface strongly declivous near apex, ventral surface gradually expanded towards base on posterior border, the surface flattened; posterior tibiae bowed, the ventral surface bisinuate with a blunt tooth situated slightly to the base of the middle of the tibiae. Wings clear, slightly suffused with brown along cross-veins; venation as in genus. Calypters yellow with yellow fringe. Halteres yellow.

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Hardy, under the name *Orthoprosopa grisea*, has recorded most of the above synonymy. I have included also *Orthoprosopa binotata* Thoms. which does not appear to differ in any detail from *H. griseus* Walker and the type was from Sydney where this species is common.

Apart from the colour there seems no reason to separate this species generically from *H. hilaris* and *H. bengalensis*, unless it be on larval characters.

The larvae and pupae have been described by Skuse (1888, p. 23) and Froggatt (1896, p. 83). The larvae are of Eristaline type, except that the siphon is a short tube and not extremely long. This may be associated with the special habitat of the larvae which are found in rotting grass-tree stumps (*Xanthorrhoea*) between the caudex and outer shell.

HELOPHILUS BENGALENSIS Wied.

Helophilus bengalensis Wiedemann, 1819, p. 3.

(For references and synonymy see Brunetti, 1923, p. 209.)

Froggatt (*Australian Insects*, p. 303) records *H. bengalensis* Wied. from Queensland. Hardy (1921, p. 16) does not include the species, but mentions that specimens of *Eristalis punctulatus* were found in various collections under the name of *Helophilus bengalensis* Wied.

While I have not seen the specimens upon which Froggatt based his records, the species certainly occurs in Australia, as there is a series of both sexes in the Macleay Museum from Queensland. These specimens agree with the descriptions and figures given by de Meijere (1908, p. 233, Pl. 7, fig. 13, 14) and Brunetti (1923, p. 209, Pl. v, fig. 1-3). The structure of the intermediate femora in the male is characteristic; there is a small tooth at base and at apex the shaft is suddenly contracted or excavate with a small tooth projecting over the cavity; this character readily distinguishes the male from the male of *H. hilaris* Walker which is very similar in colour. Eyes contiguous in male for about one-third distance from vertex to frons, bare, the upper facets larger than the lower. The general colour is yellow with three prominent black stripes on mesonotum. As the females of this and the following species are hardly distinguishable except on details of the abdominal banding, the following description is taken from Brunetti: "Abdomen: first segment black, remainder orange yellow; second segment with basal and hind marginal black bands, broader in middle (former not attaining, latter attaining, side margins), joined by a median black band of varying width which may sometimes be practically absent; hind marginal band sometimes replaced by merely a deeper orange than the ground colour; third segment with a depressed black triangular spot on hind margin, reaching side margins and often extended forward in centre as a fine line as far as middle of segment. Pubescence on first three segments very short and fine, yellow on yellow parts, dark brown on black parts, fourth segment with close yellow, yellowish-grey or orange tomentum; hind margin more or less moderately shining brown or blackish; a bow-shaped or inverted V-shaped mark, which may be deep orange, brown or black lies (the convexity forwards) across middle of segment; space between it and the hind margin (which latter is not always definite) darker than on anterior half of segment".

In the male in Australian specimens the coloration of the dark parts is in general lighter than on the female, and the markings on the third and fourth is slightly produced. Posterior femora thickened, the outer edge rather feebly produced subapically, but without definite tubercle or tooth. Venation typical of genus.

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Froggatt (*Australian Insects*, p. 303) records *H. bengalensis* Wied. from Queensland. Hardy (1921, p. 16) does not include the species, but mentions that specimens of *Eristalis punctulatus* were found in various collections under the name of *Helophilus bengalensis* Wied.

While I have not seen the specimens upon which Froggatt based his records, the species certainly occurs in Australia, as there is a series of both sexes in the Macleay Museum from Queensland. These specimens agree with the descriptions and figures given by de Meijere (1908, p. 233, Pl. 7, fig. 13, 14) and Brunetti (1923, p. 209, Pl. v, fig. 1-3). The structure of the intermediate femora in the male is characteristic; there is a small tooth at base and at apex the shaft is suddenly contracted or excavate with a small tooth projecting over the cavity; this character readily distinguishes the male from the male of *H. hilaris* Walker which is very similar in colour. Eyes contiguous in male for about one-third distance from vertex to frons, bare, the upper facets larger than the lower. The general colour is yellow with three prominent black stripes on mesonotum. As the females of this and the following species are hardly distinguishable except on details of the abdominal banding, the following description is taken from Brunetti: "Abdomen: first segment black, remainder orange yellow; second segment with basal and hind marginal black bands, broader in middle (former not attaining, latter attaining, side margins), joined by a median black band of varying width which may sometimes be practically absent; hind marginal band sometimes replaced by merely a deeper orange than the ground colour; third segment with a depressed black triangular spot on hind margin, reaching side margins and often extended forward in centre as a fine line as far as middle of segment. Pubescence on first three segments very short and fine, yellow on yellow parts, dark brown on black parts, fourth segment with close yellow, yellowish-grey or orange tomentum; hind margin more or less moderately shining brown or blackish; a bow-shaped or inverted V-shaped mark, which may be deep orange, brown or black lies (the convexity forwards) across middle of segment; space between it and the hind margin (which latter is not always definite) darker than on anterior half of segment".

In the male in Australian specimens the coloration of the dark parts is in general lighter than on the female, and the markings on the third and fourth segments may be but little darker than the general surface; the pattern is, however, the same.

Hab.—Extralimital; Australia, Queensland: Port Curtis (2 ♂), Rockhampton (1 ♀). Also a male and a female each with a printed label "Sydney". This locality requires confirmation, as the specimens are old and faded and it is probable that the labels were attached at a later date. The Port Curtis and Rockhampton specimens are labelled in the late Mr. Masters's handwriting and were probably captured by that collector.

HELOPHILUS HILARIS Walker.

Helophilus hilaris Walker, 1849, p. 605; Klocker, 1924, p. 59.

A species closely allied to *H. bengalensis*, distinguishable by the structure of the intermediate femora in the male, and in the female by the abdominal coloration.

The intermediate femora show a small tooth at base as in *H. bengalensis* though smaller, but the apex is not suddenly cut away as in that species, but gradually slopes to the joint and there is no subapical tooth. The abdominal pattern is very similar to that of *H. bengalensis*, but the third segment is almost entirely dark brown with a varying amount of yellow at the sides and sometimes on the anterior margin. The black apical margin of *H. bengalensis* is represented in one female by a dark grey tomentose band, the grey dusting more distinct where it adjoins the basal dark portion; in one male the apical band is dark brown like the rest of the segment, but separated by an incomplete narrow grey band. In two other specimens the abdomen is somewhat greasy and the colour obscured, but the third segment is distinctly dark. In one male (Richmond R.) the sides of the second segment are also dark. Four specimens are under examination, of which two (♂ ♀) from Darwin are labelled as identified at the British Museum for G. F. Hill.

Hab.—N. Territory: Darwin (26.8.15, ♀; no date, ♂, G. F. Hill), Katherine River (H. W. Brown); Queensland: Brisbane (Klocker); N.S. Wales: Richmond River (Oct., 1922, ♂, Thorn).

HELOPHILUS RUFICAUDA (Bigot).

Mesembrius ruficauda, Bigot, 1883, p. 344.

This species is unknown to me; it is described as having a black thorax with two longitudinal grey bands and yellowish sides; the abdomen black with, on each side of second and fourth segments, a large yellowish-white (d'un blanc un peu jaunâtre) macule and on third segment a similar pair of pale fulvous (d'un fauve pale), the posterior border of the third segment obscure fulvous, shining, the fourth widely bordered with the same, fifth black. No mention is made as to whether the eyes are separated in the male, but this is presumably the case since the front in the type (a male) is described as "front jaune, d'un noir luisant aux dessus de la base des antennes, vertex d'un noir opaque." No mention is made of the presence of a central facial knob, the face being described as "facie flava, flavo villosa et nigro-vittata."

From the general description it would appear that the species is allied to *H. hilaris* or to *H. bengalensis*, if indeed the species is not identical with one or other of these.

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DISSOPTERA.

Dissoptera Edwards, 1915, p. 410.

Head as broad as thorax, subhemispherical; vertex broad, extending for some distance behind eyes; ocelli small, situated relatively far forward; eyes separate in both sexes, in male forehead at narrowest one-fifth of total width of head, in female slightly wider, front long, sloping downwards anteriorly to lunule, not prominently produced; face rather narrow, almost perpendicular, without hump or tubercle, slightly produced to oral margin, the latter feebly dentate at apex, lower margin of mouth parallel with general plane of body, not produced downwards; mouth opening long; proboscis rather short; cheeks narrow, small; posterior orbits broad, clothed with a collar of dense upright pubescence. Antennae situated at middle of head height, small, pendent, first and second joints short, third suborbicular, arista dorsal, subbasal, long. Eyes equally faceted, bare. Mesonotum slightly longer than wide, subparallel-sided. Scutellum comparatively large, apical margin rounded. Abdomen elongate, conical, with five visible segments, second segment widest, thence width regularly diminishing to apex, second segment also longest, the remainder decreasing in length. Legs simple. Wings with cell R_1 (marginal cell) closed; R_{4+5} with distinct loop, but less marked than in *Eristalis*; r-m cross-vein before middle of median cell, approximately at one-third of length of cell, slightly oblique; apical portions of M_{1+2} and M_{3+4} parallel to wing border; alula large. Calypters normal. Clothing consisting partly of long pubescence and partly of very short solid scales.

The above generic description is based on Australian specimens, but agrees well with Edwards's description. The position of the genus in the Eristalinae is open to question on account of the position of r-m. The genus is distinguished from *Eristalis* partly on the position of this cross-vein and partly on the head structure.

DISSOPTERA POLLINOSA Edwards.

Dissoptera pollinosa Edwards, 1915, p. 410, Pl. xxxviii, fig. 6.—*Eristalis flavohirta* Klocker, 1924, p. 57, Pl. x, fig. 2.

The description and figure given by Edwards correspond very closely with Klocker's description and figure of *E. flavohirta* and with specimens of a species from various localities in North Queensland.

The peculiar pollinose clothing described both by Edwards and Klocker is very distinctive.

It is possible that this species should bear the name of *Dissoptera heterothrix* de Meijere. Professor Bezzi in a private letter states: "I have one species from Australia; *heterothrix* de Meijere, from Kuranda, Queensland, Dodd, and from Cairns, Illingworth, distinct by the yellow scaly hairs below the usual pubescence". The specimens before me agree exactly with the description and figure of *D. pollinosa* Edwards and differ in several points from the description of *heterothrix* de Meijere. The chief differences lie in the median dark vitta being complete on all the abdominal segments and in the darker posterior femora and tibiae. It is doubtful if these points are of specific importance and it is possible that *pollinosa* should be sunk as a synonym of *heterothrix*. I should doubt the occurrence of two such closely allied forms in Australia.

Hab.—N. Queensland: Dunk Island (Klocker), Cairns District (Dodd), Claudie River (Macgillivray), Townsville (Hill); extralimital.

Dissoptera.

Dissoptera Edwards, 1915, p. 410.

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Hab.—N. Queensland: Dunk Island (Klocker), Cairns District (Dodd), Claudie River (Macgillivray), Townsville (Hill); extralimital.

Subfamily MICRODONTINAE.

Antennae porrect, elongate; arista dorsal, subbasal; eyes bare, wide apart in both sexes; face broad. Wings short; R_5 generally present as an appendix to R_{4+5} crossing middle of cell R_5 (1st posterior cell); M_{1+2} strongly recurrent, apical portion of M_{3+4} bent upwards, r-m cross-vein before middle of median cell.

The genus *Microdon* constitutes the greater part of this subfamily (Brunetti, 1923, p. 307). Apparently all the Australian species should be referred to this genus. One species (*variegatus*) has, however, been referred to *Mixogaster*, but wrongly so, as Knab and Malloch (1922, p. 233) state that "the genus *Mixogaster* . . . . is quite a distinct concept, and apparently confined to America". The same species was originally placed by Walker in the genus *Ceratophya* Macq., but the genus is stated by Knab and Malloch to be "poorly defined and it is extremely doubtful that the Australian species should be referred to it".

Brunetti has proposed a new genus *Paramixogaster* for a species from India, originally described as a *Mixogaster*. In his key this author separates *Paramixogaster* from *Microdon* on the third joint of the antennae being much longer (5-6 times) than the first, whereas in *Microdon* the first is as long as (generally longer than) the third. The type species would appear to be very closely allied to the Australian species, *M. variegatus* Walk., especially in the general wasp-like form and in the antennal proportions. I cannot, however, regard the Australian species as separable generically from *Microdon* on antennal structure alone, since the antennae are so diverse in different Australian species of this genus. One of the new species, *M. hardyi*, has an antennal structure similar to that of *M. variegatus*, but the abdomen is not wasp-like. The extraordinary third joint seen in *M. alcicornis* might be regarded as justification for the separation of this species if the antennal structure is held to be of generic value.

Williston (Manual of N. American Diptera, 3rd Edition) separates *Mixogaster* from *Microdon* on the abdominal structure. But the wasp-like abdomen characterization of *M. variegatus* does not appear to be sufficient reason to separate this species from other Australian species, as *M. hardyi*, which has similar antennae, has nevertheless a typical *Microdon* abdomen. Furthermore, in other genera, e.g. *Cerioides*, the abdomen may be wasp-like or not. Also in other faunal regions, e.g. the Malayo-Papuan, species of *Microdon* have been described with pedunculate abdomen. For these reasons I prefer to regard all the known Australian species as belonging to *Microdon*.

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(For synonymy and references see Brunetti, 1923, p. 307.)

Head broad, somewhat flattened; eyes bare, widely separated in both sexes; face pubescent, gently convex, generally retreating to oral margin, which is not prominent; antennae porrect, arista subbasal, bare. Thorax subquadrate, rather densely pubescent, the derm often minutely punctate and with fine, often indistinct, transverse scratches or striae, giving the thorax a shagreened appearance; scutellum with or without two blunt teeth near apex. Abdomen variable in shape, generally ovate and curved downwards. Legs short and thick, tarsi wide. Wings with characteristic venation, cell R_1 (marginal cell) widely open; R_{4+5} with rudiment of R_5 projecting downwards about halfway across underlying cell; M_{1+2} strongly recurrent, closing cell R_5 (first posterior cell); apical portion of M_{3+4} nearly upright, straight or slightly sinuate, sometimes a stump of a vein present at the angulations of M_{1+2} and M_{3+4}; r-m situated before middle of median cell.

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This genus appears to be rather strongly represented in Australia, though the species are, with one or two exceptions, rare and, in several cases, represented by single specimens.

The synonymy is somewhat involved and previous attempts to elucidate it have not been too successful. The present attempt is based on a greater amount of material than has been hitherto available, and even now the identity of one species is obscure. Hardy (1921, p. 15), in his review of the genus, allowed three species—*pictipennis*, *vittatus* and *variegatus*—sinking *M. brachycerus* K. and M. and *Eumerus transiens* Walk. as synonyms of *vittatus* Macq.; *Mixogaster aphritinus* Thomson and *Microdon daveyi* as synonyms of *M. variegatus* Walk.

While much of this synonymy is undoubtedly correct, I do not think that *M. brachycerus* is a synonym of *M. vittatus* Macq., but on the other hand would identify it with the species regarded (as I think, incorrectly) as *M. pictipennis* Macq. The identity of the latter species is uncertain; the description does not appear to correspond with any species before me and I have been compelled to regard it as unknown to me.

Since the publication of Hardy's paper a further species—*M. nigromarginalis*—has been described by Curran and Bryan; this is represented in Australian collections, but has generally been confused with *M. brachycerus* under the name *M. pictipennis*.

In the present paper no less than eleven species are proposed as new. This is probably only a small part of the number to be found, as the western parts of the continent are not represented by any known species.

Distribution.—The species are distributed along the eastern coast of Australia including Tasmania. While some are represented by single specimens, others are known to have a wide range, e.g. *M. nigromarginalis* ranges from Queensland to southern New South Wales, *M. variegatus* from Queensland to South Australia and *M. brachycerus* from Queensland to Tasmania. *M. vittatus* occurs from New South Wales to Tasmania, *M. chalybeus* is known from Queensland, Victoria and probably Tasmania, and *M. alcicornis* from Queensland, New South Wales and possibly Tasmania. *M. dimorphon* is known from Western Australia, South Australia and Queensland; *M. modestus* from Queensland, New South Wales and Western Australia and *M. nicholsoni* from Queensland and New South Wales. *M. amabilis* is recorded only from Queensland; *M. barringtonensis*, *M. waterhousei* and *M. macquariensis* from New South Wales; *M. hardyi* from Tasmania and *M. occidentalis* from Western Australia.

Life History.—Two of the Australian species, *variegatus* and *brachycerus*, are known to breed in association with ants and the larvae and pupae have been described by Knab and Malloch. Recently Mr. Nicholson has bred the former species in some quantity from pupae found beneath the bark of a tree in association with ants. The larvae of an unidentified species have been sent me from Victoria by Mr. Barrett, the specimens having been taken in an ant's nest.

Mr. Bertram of Sydney has also succeeded in breeding out *M. nigromarginalis* C. and B. from pupae found in a fallen tree trunk in cavities in the wood, the larvae and pupae being definitely associated with ants. It is probable that the other species will also be found to pass their larval and pupal stages in ants' nests or run-ways, but the peculiar and striking pattern of *M. waterhousei* suggests a possible association with some species of wasps.

Mr. Clark, of Perth, has recently sent me specimens of *M. dimorphon* bred from pupae found in the nests of species of *Iridomyrmex*.

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Measurements.—In the measurement of the antennal proportions the same ocular micrometer has been used with the same combination of lenses. The relative proportions of all the antennae are, therefore, comparable. Each division of the ocular micrometer is equivalent to 0·066 mm. with the lenses used, and this factor may be used to multiply the figures given if the actual lengths of the joints are required.

Table of Species of Microdon.

1. Abdomen pedunculate, wasp-like .... *M. variegatus* Walk.
Abdomen not pedunculate 2
2. Third antennal joint bifurcate .... *M. alcicornis*, n. sp.
Third antennal joint simple 3
3. Scutellum dentate 4
Scutellum simple, at most sulcate at apex 6
4. Third antennal joint much longer than first; antennae long (12 : 2 : 34) .... *M. hardyi*, n. sp.
Whole antennae short 5
5. Dull brown or blackish species (4 : 2 : 9) .... *M. brachycerus* K. & M.
Metallic-blue species (4 : 3 : 5) .... *M. nicholsoni*, n. sp.
6. First antennal joint longer than third, antennae long 7
First antennal joint at most as long as third, generally shorter, antennae short .. 8
7. Dull brown species with inconspicuous clothing (15 : 3 : 13) .. *M. macquariensis*, n. sp.
Brightly coloured species with bright orange transverse bands on abdomen (20 : 6 : 14) .... *M. waterhousei*, n. sp.
8. Tufts of bright golden pubescence present on mesonotum and pleura, antennal proportions (10 : 2 : 10) .... *M. amabilis*, n. sp.
No such tufts of pubescence present 9
9. Third antennal joint elongate with concave upper surface 10
Third antennal joint elongate ovate 12
10. Blue species with blue venter 11
♂ blue with blue and yellow abdomen; ♀ black .... *M. dimorphon*
11. Third joint strongly upturned at extremity (8 : 2 : 20) .... *M. occidentalis*, n. sp.
Third joint gently concave on upper surface (4 : 2 : 16) .... *M. chalybeus*, n. sp.
12. Scutellum with thick fringe of erect black hair along apical margin .... *M. nigromarginalis* C. & B.
Scutellum with yellow pubescence, not forming a distinct fringe 13
13. Scutellum dark, apex sulcate .... *M. modestus*, n. sp.
Scutellum pale brown or testaceous, apex not definitely sulcate 14
14. First two antennal joints black, relative antennal proportions 5 : 2 : 7 .... *M. vittatus* Macq.
First two antennal joints reddish brown, relative antennal proportions 7 : 3 : 9 .... *M. barringtonensis*, n. sp.

M. pictipennis Macq. is omitted from the above table as unknown to me.

MICRODON VARIEGATUS Walker. (Plate xiv.)

Ceratophya variegata Walker, 1852, p. 220, Pl., fig. 6.—*Mixogaster aphritinus* Thomson, 1868, p. 491.—*Microdon daveyi* Knab and Malloch, 1912, p. 233.—*Microdon variegata* Hardy, 1921, p. 15.

The above synonymy is given on the authority of Hardy (1921) and appears to be certainly correct. Among the extensive series of specimens before me I can only recognize a single species with pedunculate, wasp-like abdomen. Knab and Malloch discuss the question of the generic separation of this species from *Microdon*, but conclude that there is no adequate reason for it. The point has already been dealt with in this paper and need not be elaborated here.

The very long third joint of the antennae is paralleled in *Paramixogaster vespiformis* Brunetti of India, but a similar structure occurs in *Microdon hardyi*.

Measurements.—In the measurement of the antennal proportions the same ocular micrometer has been used with the same combination of lenses. The relative proportions of all the antennae are, therefore, comparable. Each division of the ocular micrometer is equivalent to 0·066 mm. with the lenses used, and this factor may be used to multiply the figures given if the actual lengths of the joints are required.

Table of Species of Microdon.

1. Abdomen pedunculate, wasp-like .... *M. variegatus* Walk.
Abdomen not pedunculate 2
2. Third antennal joint bifurcate .... *M. alcicornis*, n. sp.
Third antennal joint simple 3
3. Scutellum dentate 4
Scutellum simple, at most sulcate at apex 6
4. Third antennal joint much longer than first; antennae long (12 : 2 : 34) .... *M. hardyi*, n. sp.
Whole antennae short 5
5. Dull brown or blackish species (4 : 2 : 9) .... *M. brachycerus* K. & M.
Metallic-blue species (4 : 3 : 5) .... *M. nicholsoni*, n. sp.
6. First antennal joint longer than third, antennae long 7
First antennal joint at most as long as third, generally shorter, antennae short .. 8
7. Dull brown species with inconspicuous clothing (15 : 3 : 13) .. *M. macquariensis*, n. sp.
Brightly coloured species with bright orange transverse bands on abdomen (20 : 6 : 14) .... *M. waterhousei*, n. sp.
8. Tufts of bright golden pubescence present on mesonotum and pleura, antennal proportions (10 : 2 : 10) .... *M. amabilis*, n. sp.
No such tufts of pubescence present 9
9. Third antennal joint elongate with concave upper surface 10
Third antennal joint elongate ovate 12
10. Blue species with blue venter 11
♂ blue with blue and yellow abdomen; ♀ black .... *M. dimorphon*
11. Third joint strongly upturned at extremity (8 : 2 : 20) .... *M. occidentalis*, n. sp.
Third joint gently concave on upper surface (4 : 2 : 16) .... *M. chalybeus*, n. sp.
12. Scutellum with thick fringe of erect black hair along apical margin .... *M. nigromarginalis* C. & B.
Scutellum with yellow pubescence, not forming a distinct fringe 13
13. Scutellum dark, apex sulcate .... *M. modestus*, n. sp.
Scutellum pale brown or testaceous, apex not definitely sulcate 14
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The very long third joint of the antennae is paralleled in *Paramixogaster vespiformis* Brunetti of India, but a similar structure occurs in *Microdon hardyi*.

The relative proportions of the three joints is somewhat variable; measurements of a series gave the following results:

Specimen.	1st joint.	2nd joint.	3rd joint.
Sydney, ♂	8	1	32
,, ♂	11	1	46
,, ♀	11	2	36
,, ♀	11	2·5	35
,, ♀	11	3	30
,, ♀	12	2	39
N.S.W., ♀	12	2	35
,, ♀	10	2	31
Illawarra, ♂	11	1	52
Blue Mts., ♂	12	2	37
Woy Woy, ♂	11	1	48
,, ♂	12	2	50
Brisbane, ♀	10	2	16
,, ♀	11	2	33
,, ♀	11	3	30
S. Australia, ♀	10	2	27
Victoria, ♀	12	3	31
,, ♀	12	4	30
,, ♀	10	2·5	25
,, ♂	11	2·5	27
,, ♂	11	2	35
,, ♀	11	2·5	29
,, ♂	11	1·5	38
,, ♀	11	3	28
,, ♂	11	2	42
,, ♀	12	3	29
,, ♀	11	3	25

The species appears to be widely distributed along the eastern coast, from Victoria to as far north as Brisbane, while one specimen is before me from South Australia.

The larvae and pupae occur in ants' nests and the puparium has been described by Malloch and Knab. The following description is taken from these authors: "The puparium is of the shape usual in *Microdon*, elongate-elliptical, nearly straight side with very slight indications of constrictions near middle, strongly convex, the ventral surface (by which it is attached) perfectly flat, colour ferruginous yellow, the margin slightly darker, thoracic horns ferruginous brown, posterior respiratory horn reddish brown, pruinose; the dorsal surface shows a median longitudinal crease extending the entire length to the posterior respiratory tubercle; on each side of this the surface is broken into reticulations, larger and forming fairly regular rows towards the middle, somewhat smaller and more irregular towards the sides, there being about ten longitudinal rows on each half; the surface is granular and the reticulations are produced by rows of closely approximated minute, white, tuberculated spines; the surface between the reticulations is somewhat depressed; the posterior respiratory tube is somewhat thickened at the base, with a dorsal basal swelling, bluntly rounded at the tip, the surface coarsely granular.

"Length 8·5 mm., width 5 mm., height 3 mm.".

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Woy Woy,	♂	11	1	48
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S. Australia,	♀	10	2	27
Victoria,	♀	12	3	31
,,	♀	12	4	30
,,	♀	10	2·5	25
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"Length 8·5 mm., width 5 mm., height 3 mm.".

I am indebted to Mr. A. J. Nicholson for permission to publish the accompanying photographs (Plate xiv) of the fly and its puparium which were taken by him at Lindfield, Sydney.

MICRODON ALCICORNIS, n. sp.

A blackish species with bifurcate antennae.

♂. Head black, front black with faint green sheen, very broad, wider than the width of an eye, closely punctate, a triangular area around and in front of ocelli, laevigate, with few punctures; pubescence mainly dark, but white in front and on vertex; face reddish-brown, subquadrate, moderately closely punctate and with rather dense white pubescence; cheeks black and with white pubescence; eyes bare. Antennae black, of extraordinary form, first joint cylindrical, about two and a half times the length of the small second joint; third joint very large, much longer than the other two joints together, biramate, the upper branch curving upwards and then forwards, the lower forwards and then upwards to end on a level with tip of upper branch, the junction of the two branches rounded, not angulate, both branches thick, but the lower considerably the thicker, the upward-turned portion thinner and somewhat rotated; arista stout, arising at base of fork, slightly to outer side and ending within the space enclosed by the branches; relative proportions of joints 5:2:30.

Mesonotum black, punctate and finely strigose in places, giving an appearance of shagreen; pubescence mainly dark, some light pubescence present on sides, as a feeble band along transverse suture, and as another band along posterior margin. Scutellum dark, punctate; pubescence mainly dark with some light hairs intermingled. Pleurae mainly black, with pale pubescence. Abdomen not markedly constricted at base, closely granulate, reddish-brown, darker at base, the first segment black, pubescence mainly dark, white patches present along the apical margins of second and third segments in outer half, extending on to adjacent laterobasal angles of third and fourth segments respectively, a small obscure pale band on each side of base of second, a pale patch on each side of mid-line at apex of fourth.

Legs with coxae, trochanters, basal two-thirds of femora and tarsi black, the apical third of femora and all the tibiae yellowish-brown.

Wings grey, more darkly suffused along the veins; venation normal, stump of R_5 present. Calypters white; halteres brown with yellow clubs.

Length, 8 mm.

Hab.—New South Wales: Como, 18.10.25 (Nicholson). Type in Macleay Museum. A second male is in the South Australian Museum labelled Tasmania, Simson, 2772.

Mr. Hardy informs me that he has seen the species from Queensland.

The antennal structure is most extraordinary, but I do not think sufficient to justify the erection of a new genus, as in all other respects the species is in agreement with other Australian species of *Microdon* and the antennae are most variable in the genus.

MICRODON HARDYI, n. sp.

♂. Black and ferruginous species with long antennae. Head black, front broad, about half as wide anteriorly as at vertex, black with dark pubescence; face testaceous in centre, becoming ferruginous above and at sides, rather densely clothed at sides and below with whitish hairs; cheeks and occipital region with similar hairs. Antennae black; first joint moderately long, rather slender; second

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Thorax dark brown, slightly iridescent, more testaceous at sides and base with rather long appressed straw-coloured pubescence, denser across mesonotum in front of suture and at posterolateral angles. Scutellum dark testaceous, apex slightly grooved with a short tooth on each side of groove, clothed with yellowish pubescence. Postnotum black; pleural segments testaceous, becoming darker below with rather long yellowish pubescence in middle.

Abdomen ferruginous, somewhat darker towards apex, not greatly constricted at base, clothed with fine short dark pubescence, with longer white hairs irregularly arranged on each side of mid-line on second segment, forming a transverse patch on each side of apex of third extending along lateral margins, a band along lateral and an irregular patch at each side of apex of fourth segment; longer white pubescence present on lateral margin of second segment at base; under surface testaceous with white pubescence.

Legs testaceous, the basal two-thirds of femora, excepting extreme base, black, posterior metatarsi thickened.

Wings smoky-grey, somewhat lighter in basal cells.

Length, 9 mm.

Hab.—Hobart, January, 1924 (G. H. Hardy).

MICRODON BRACHYCERUS Knab and Malloch.

Microdon brachycerus Knab and Malloch, 1912, p. 235.—*M. pictipennis* Hardy, 1921, p. 15, *nec* Macquart, 1850, p. 129.

This species is certainly distinct from *M. vittatus*, but appears to be referable to that recorded by Hardy under the name *M. pictipennis* Macq.

The colour varies somewhat in different specimens; a Tasmanian specimen agrees well with the original description, but mainland specimens are as a rule darker with practically black abdomen. A series of Queensland specimens in the Macleay Museum are, however, lighter and correspond with the Tasmanian specimen.

The species may be recognized from other Australian species by the combination of dark nonmetallic colour, short antennae and dentate scutellum. The relative antennal proportions are given by Knab and Malloch as 3:1:16. This seems certainly an error, as antennae with such proportions could not be described as "short and stout"; I believe that the 16 is probably a misprint for 6,* which agrees with the proportions in the specimens before me.

The larvae and pupae have been found in ants' nests and the puparium described by Knab and Malloch: "The puparium is of the shape usual in this genus—elliptical, strongly convex, flattened beneath where it is attached to a stone or other surface. The colour is dull yellowish-brown, obscured by irregularly attached particles of earth; the anterior pupal respiratory horns and the posterior larval ones are ferruginous; posterior respiratory tubercle bifid at tip. The dorsal surface is nearly smooth and shows none of the usual reticulations, but instead is studded with scattered prominent brown tubercles (somewhat obscured

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* This surmise has been proved correct by a recent letter from Mr. Malloch, dated 24th February, 1926.

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Hab.—Tasmania: Hobart, Zeehan; New South Wales: Sydney, Blue Mountains; Queensland: Rockhampton.

MICRODON NICHOLSONI, n. sp.

♀. Head black with slight bluish and greenish iridescence; front parallel-sided (about half the eye width), with dark hairs, a narrow line of pale pubescence present along orbital margin in lower part of front; face retreating towards mouth, practically parallel-sided, but very slightly narrower than front, with mingled dark and pale hairs, the dark hairs predominating above; cheeks narrow with scanty pale pubescence; occipital margin with black hairs; antennae stout, black, the second and third joints with dense grey pubescence; first joint narrow at base, widened towards apex; second shorter than first, but wider at apex; third slightly longer than first, rounded, almost orbicular, arista stout, longer than joint, set on outer surface near base, with a groove extending frontwards along outer side; relative proportions of joints 4:3:5 (*vix*).

Mesonotum black, iridescent on disc, with black pubescence; scutellum dark blue-black, a small tooth present on each side of apex, almost obscured by rather long black pubescence with which a few paler hairs are intermingled; pleural segments black shining, some black hairs in anterior portion. Abdomen deep blue with short black pubescence, longer at sides of base, first segment narrow; second slightly widened from base to apex; third and fourth broad but gradually decreasing in width towards apex; venter blue-black. Legs reddish-yellow, coxae, trochanters, and basal third of femora shining black, tibiae with a narrow oblique black ring in outer third, this ring covering a scar-like impression on the posterior tibiae; tarsi somewhat infuscate; pubescence mainly dark, with some golden hairs on tibiae and dense golden pubescence on under side of tarsi. Wings grey, slightly suffused with darker along the veins; venation as in genus, the projection from R_5 well marked extending half way across the cell R_5, the rudiment of M_2 also present. Halteres light yellow.

Length, 9 mm.

Hab.—New South Wales: Woodford (15.11.25, Nicholson). Holotype in Macleay Museum. Described from a single ♀ recently captured by Mr. Nicholson by sweeping. There is another specimen in the Macleay Museum which may belong to the same species, but it is badly mutilated and the abdomen missing; it agrees with *nicholsoni*, except that the scutellar pubescence is almost entirely pale and the wings are practically clear. This can hardly be *pictipennis* Macq., as there is complete absence of any pale clothing on thorax or abdomen. The form of the third antennal joint is unlike that of any other known Australian species.

VAR.: A specimen from Queensland may represent a variety or even a distinct species.

♀. Differs in the presence of white pubescence forming distinct bands on the apical margins of the 3-5 abdominal segments, these bands being interrupted in the middle line; in the pale pubescence on the face extending to base of antennae and in the lighter yellow colour of the basal half of the tibiae.

Hab.—Queensland: Mt. Tambourine (H. Hacker, 28.10.11).

This form agrees rather closely with the description of *M. pictipennis*, except that the wings are not very markedly suffused and the basal antennal joints are not testaceous.

by the attached particles of earth). Length 7 mm.; width 5·5 mm.; height about 3 mm".

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♀. Head black with slight bluish and greenish iridescence; front parallel-sided (about half the eye width), with dark hairs, a narrow line of pale pubescence present along orbital margin in lower part of front; face retreating towards mouth, practically parallel-sided, but very slightly narrower than front, with mingled dark and pale hairs, the dark hairs predominating above; cheeks narrow with scanty pale pubescence; occipital margin with black hairs; antennae stout, black, the second and third joints with dense grey pubescence; first joint narrow at base, widened towards apex; second shorter than first, but wider at apex; third slightly longer than first, rounded, almost orbicular, arista stout, longer than joint, set on outer surface near base, with a groove extending frontwards along outer side; relative proportions of joints 4:3:5 (*vix*).

Mesonotum black, iridescent on disc, with black pubescence; scutellum dark blue-black, a small tooth present on each side of apex, almost obscured by rather long black pubescence with which a few paler hairs are intermingled; pleural segments black shining, some black hairs in anterior portion. Abdomen deep blue with short black pubescence, longer at sides of base, first segment narrow; second slightly widened from base to apex; third and fourth broad but gradually decreasing in width towards apex; venter blue-black. Legs reddish-yellow, coxae, trochanters, and basal third of femora shining black, tibiae with a narrow oblique black ring in outer third, this ring covering a scar-like impression on the posterior tibiae; tarsi somewhat infuscate; pubescence mainly dark, with some golden hairs on tibiae and dense golden pubescence on under side of tarsi. Wings grey, slightly suffused with darker along the veins; venation as in genus, the projection from R_5 well marked extending half way across the cell R_5, the rudiment of M_2 also present. Halteres light yellow.

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This form agrees rather closely with the description of *M. pictipennis*, except that the wings are not very markedly suffused and the basal antennal joints are not testaceous.

MICRODON MACQUARIENSIS, n. sp.

A brownish species, the abdomen marked with patches of white pubescence.

♂. Head brown, front dark brown, blackish in centre and around ocelli, with pale yellow pubescence, about twice as wide at vertex as anteriorly; face convex, light brown, darker above and at sides, densely clothed with white pubescence; cheek similar. Antenna comparatively long, first joint black, elongate, almost as long as second and third joints together, slightly laterally compressed; second joint short, broadened at apex, black; third joint stout, the upper surface somewhat concave, yellowish-brown at base, the rest blackish, four times as long as second joint, the relative proportion of the three joints being 15:3:13, arista arising near base. Eyes bare. Mesonotum dark brown, almost black on disc, the humeral angles and lateral margins light yellowish-brown, pubescence short, mostly dark, but with some ill-defined patches of yellowish pubescence only visible from certain directions. Scutellum light brown, darker at base, with dark pubescence and an apical fringe of yellow pubescence. Pleural segments pale grey, almost white in upper portion, dark brown in lower; pubescence white. Abdomen dark brown with dark median vitta and lighter patches. Second visible segment with pale areas on each side of basal margin and along apical margin, those areas interrupted in middle line, pubescence black on dark areas, white on pale areas; third segment with anterolateral angles and lateral margins pale, and a pale area on each side extending as a longitudinal band on each side of median vitta, then as a transverse band along posterior margin; fourth segment similarly marked, but longitudinal limb of L longer than transverse. These pale areas clothed with white pubescence, the rest with dark; fifth segment pale brown; venter pale brown with white pubescence. Legs pale brown, the basal two-thirds of the femora blackish; the metatarsi not markedly thickened. Wings hyaline without shading along veins; venation normal. Calypters white with pale margins. Halteres pale yellow.

Length, ♂. 9 mm.; antennae 2 mm.

Hab.—New South Wales: Dubbo (24.4.24).

Described from a single ♂ taken by myself on the golf links at Dubbo.

The arrangement of the pale pubescence on the thorax is hard to make out, as from above all the hairs appear dark, but when viewed from in front a large patch of yellow pubescence is evident in the anterior and outer portion in front of suture; viewed from behind the yellow pubescence appears to extend across the base and forwards on each side of the middle line.

The species is somewhat similar in appearance to *M. vittatus* Macq., but *inter alia* differs widely in the proportions of the antennal joints.

MICRODON WATERHOUSEI, n. sp.

Black, iridescent, with two broad reddish-orange abdominal bands.

♀. Front broad, black, iridescent, with golden pubescence and some blackish hairs around the ocelli; face convex, slightly narrower below than above, dark greenish, iridescent, with dense white pubescence, the upper lateral portion with gold pubescence descending from front; cheeks with white pubescence; upper portion of occipital margin with golden, the rest with whitish pubescence. Antennae black, long, the first joint very long and slender, as long as second and third combined; second joint short; third joint about twice as long as second joint and two-thirds as long as first, stout elongate, ovate, with a deep groove along the upper and outer surface, and a small pit near apex on same surface; arista arising near base, shorter than joint; relative proportions of joints 20:6:14. Eyes

MICRODON MACQUARIENSIS, n. sp.

A brownish species, the abdomen marked with patches of white pubescence.

♂. Head brown, front dark brown, blackish in centre and around ocelli, with pale yellow pubescence, about twice as wide at vertex as anteriorly; face convex, light brown, darker above and at sides, densely clothed with white pubescence; cheek similar. Antenna comparatively long, first joint black, elongate, almost as long as second and third joints together, slightly laterally compressed; second joint short, broadened at apex, black; third joint stout, the upper surface somewhat concave, yellowish-brown at base, the rest blackish, four times as long as second joint, the relative proportion of the three joints being 15:3:13, arista arising near base. Eyes bare. Mesonotum dark brown, almost black on disc, the humeral angles and lateral margins light yellowish-brown, pubescence short, mostly dark, but with some ill-defined patches of yellowish pubescence only visible from certain directions. Scutellum light brown, darker at base, with dark pubescence and an apical fringe of yellow pubescence. Pleural segments pale grey, almost white in upper portion, dark brown in lower; pubescence white. Abdomen dark brown with dark median vitta and lighter patches. Second visible segment with pale areas on each side of basal margin and along apical margin, those areas interrupted in middle line, pubescence black on dark areas, white on pale areas; third segment with anterolateral angles and lateral margins pale, and a pale area on each side extending as a longitudinal band on each side of median vitta, then as a transverse band along posterior margin; fourth segment similarly marked, but longitudinal limb of L longer than transverse. These pale areas clothed with white pubescence, the rest with dark; fifth segment pale brown; venter pale brown with white pubescence. Legs pale brown, the basal two-thirds of the femora blackish; the metatarsi not markedly thickened. Wings hyaline without shading along veins; venation normal. Calypters white with pale margins. Halteres pale yellow.

Length, ♂. 9 mm.; antennae 2 mm.

Hab.—New South Wales: Dubbo (24.4.24).

Described from a single ♂ taken by myself on the golf links at Dubbo.

The arrangement of the pale pubescence on the thorax is hard to make out, as from above all the hairs appear dark, but when viewed from in front a large patch of yellow pubescence is evident in the anterior and outer portion in front of suture; viewed from behind the yellow pubescence appears to extend across the base and forwards on each side of the middle line.

The species is somewhat similar in appearance to *M. vittatus* Macq., but *inter alia* differs widely in the proportions of the antennal joints.

MICRODON WATERHOUSEI, n. sp.

Black, iridescent, with two broad reddish-orange abdominal bands.

♀. Front broad, black, iridescent, with golden pubescence and some blackish hairs around the ocelli; face convex, slightly narrower below than above, dark greenish, iridescent, with dense white pubescence, the upper lateral portion with gold pubescence descending from front; cheeks with white pubescence; upper portion of occipital margin with golden, the rest with whitish pubescence. Antennae black, long, the first joint very long and slender, as long as second and third combined; second joint short; third joint about twice as long as second joint and two-thirds as long as first, stout elongate, ovate, with a deep groove along the upper and outer surface, and a small pit near apex on same surface; arista arising near base, shorter than joint; relative proportions of joints 20:6:14. Eyes bare. Mesonotum blackish, with coppery, purple and violet iridescence, finely strigose; the presutural portion densely clothed with orange pubescence, extending along each lateral margin in a narrow line to merge into a large triangular prescutellar patch of same colour; clothing between the two orange patches black and more scanty; scutellum iridescent, with dense orange pubescence. Pleurae black with dark green iridescence, pubescence whitish, except on propleura, where it is golden. Abdomen elongate, subparallel-sided; first visible segment greenish iridescent; second segment violet iridescent at sides, greenish iridescent in centre with orange pubescence; third segment orange with a small greenish iridescent area at base, the whole clothed with deep orange pubescence, denser in the posterior portion of the segment; fourth segment longer, convex, the greater portion black with violet iridescence and clothed with black pubescence, a narrow lateral band and approximately about the posterior quarter of the segment orange with dense orange pubescence; fifth segment black with orange pubescence along sides. Venter black, the two basal segments narrowly orange, pubescence whitish. Legs brown, the basal half of femora and coxae black; posterior metatarsi strongly incrassate, the other metatarsi less so. Wings grey, suffused with brown along the anterior margin and along the veins; venation as in genus. Calypters white with brown margin. Halteres yellow.

Length, ♀. 12 mm.

Hab.—Killara, Sydney (12.2.25).

The unique specimen of this fine species was captured by Dr. G. A. Waterhouse, in the grounds of his home "Allowrie", in Killara. When taken it was hovering in front of the trunk of a tree as if seeking a hole. From the distinctly wasplike scheme of colouring and from its actions, it seems probable that the species may be found to be parasitic in the larval stage on some species of wasp.

The richly coloured clothing renders the species quite distinct from any other described from Australia, while the proportions of the antennal joints are also distinctive.

Holotype presented to the Australian Museum.

MICRODON AMABILIS, n. sp.

A small dark species with brilliant golden pubescent tufts.

♀. Head black; front between one-third and one-fourth the total head width, sides parallel above, divergent anteriorly, black feebly iridescent, pubescence black, a few golden hairs on each side in front of middle; face somewhat wider than front, mainly metallic green iridescent, violet about base of antennae with a median, black, laevigate vitta from antennae to beyond middle, violet around oral margin, clothed with bright golden pubescence, except on black portion of median line and around oral margin, some white pubescence along orbits between eye margin and the golden pubescence; cheeks dark; posterior orbits with grey pubescence in lower half, black on upper and on vertex. Antennae black, rather slender, first joint elongate, slender, cylindrical; second short; third as long as, but broader than, first, obtusely rounded at apex and flattened; arista short, subbasal, on outer flattened surface; relative proportions of joints 10:2:10.

Mesonotum black, feebly iridescent, the anterior margin and humeral angles metallic green iridescent, a greenish patch present in front of scutellum, lateral margins violet iridescent; pubescence black, a dense tuft of bright golden pubescence on greenish area in front of scutellum. Scutellum metallic-green, with rather sparse greyish pubescence, more golden at base; apex rounded, not dentate. Pleural segments violet, greenish on mesopleuron, with a tuft of dense golden bare. Mesonotum blackish, with coppery, purple and violet iridescence, finely strigose; the presutural portion densely clothed with orange pubescence, extending along each lateral margin in a narrow line to merge into a large triangular prescutellar patch of same colour; clothing between the two orange patches black and more scanty; scutellum iridescent, with dense orange pubescence. Pleurae black with dark green iridescence, pubescence whitish, except on propleura, where it is golden. Abdomen elongate, subparallel-sided; first visible segment greenish iridescent; second segment violet iridescent at sides, greenish iridescent in centre with orange pubescence; third segment orange with a small greenish iridescent area at base, the whole clothed with deep orange pubescence, denser in the posterior portion of the segment; fourth segment longer, convex, the greater portion black with violet iridescence and clothed with black pubescence, a narrow lateral band and approximately about the posterior quarter of the segment orange with dense orange pubescence; fifth segment black with orange pubescence along sides. Venter black, the two basal segments narrowly orange, pubescence whitish. Legs brown, the basal half of femora and coxae black; posterior metatarsi strongly incrassate, the other metatarsi less so. Wings grey, suffused with brown along the anterior margin and along the veins; venation as in genus. Calypters white with brown margin. Halteres yellow.

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♀. Head black; front between one-third and one-fourth the total head width, sides parallel above, divergent anteriorly, black feebly iridescent, pubescence black, a few golden hairs on each side in front of middle; face somewhat wider than front, mainly metallic green iridescent, violet about base of antennae with a median, black, laevigate vitta from antennae to beyond middle, violet around oral margin, clothed with bright golden pubescence, except on black portion of median line and around oral margin, some white pubescence along orbits between eye margin and the golden pubescence; cheeks dark; posterior orbits with grey pubescence in lower half, black on upper and on vertex. Antennae black, rather slender, first joint elongate, slender, cylindrical; second short; third as long as, but broader than, first, obtusely rounded at apex and flattened; arista short, subbasal, on outer flattened surface; relative proportions of joints 10:2:10.

Mesonotum black, feebly iridescent, the anterior margin and humeral angles metallic green iridescent, a greenish patch present in front of scutellum, lateral margins violet iridescent; pubescence black, a dense tuft of bright golden pubescence on greenish area in front of scutellum. Scutellum metallic-green, with rather sparse greyish pubescence, more golden at base; apex rounded, not dentate. Pleural segments violet, greenish on mesopleuron, with a tuft of dense golden pubescence on mesopleuron extending on to humeral angles; pubescence elsewhere scanty, whitish. Abdomen dull blackish, closely granulate, pubescence mainly short and black, some longer white hairs present at base of second segment, as an indefinite oblique line on each side of fourth segment in apical half and on the lateral margins of the second to basal half of fourth segment; venter black. Legs black, femora feebly iridescent, knees narrowly brownish; moderately long and thin, the posterior metatarsi long but distinctly broadened; pubescence mainly white. Wings hyaline, veins brownish, venation normal. Calypters pale brown with blackish margins; halteres yellow.

Length, 6·5 mm.

Hab.—Brisbane (26.2.19, H. Hacker). A single female in the collection of the Queensland Museum. A lovely little species, quite distinct from other Australian species and readily recognized by the tufts of dense golden pubescence.

MICRODON OCCIDENTALIS, n. sp.

A metallic-blue species very similar to *M. chalybeus*, but with different antennal proportions.

♀. Head broader than in *M. chalybeus*, front broad, about half head width, parallel-sided, moderately closely punctate, dark blue in colour, pubescence dark; face convex, retreating towards oral margin, blue-black, pubescence dark above, longer and paler below, some greyish tomentum on parafacials. Antennae longer than in *M. chalybeus*, first joint cylindrical, second very short, third joint long, considerably longer than in *M. chalybeus*, strongly curved in middle, the apex directed upwards, a slight thickening at extreme base; arista basal, shorter than length of joint; the whole antennae black; relative proportions 8:2:20.

Thorax, abdomen and legs as in *M. chalybeus*; wings with veins distinctly suffused with brown.

Length, 9 mm.

Hab.—Western Australia: Warren River (W. D. Dodd).

Described from a single female in the South Australian Museum collection.

The species is close to *M. chalybeus*, but abundantly distinguished by the antennal structure, which shows a distinct approach to the type found in *M. alcicornis*.

MICRODON CHALYBEUS, n. sp.

A metallic-blue species with reddish legs.

♂. Head deep blue, forehead about one and a half times the width of an eye, rather sparsely punctate, deep blue around ocelli, greenish iridescent anteriorly, pubescence pale in front and on vertex, elsewhere dark; face convex, sides slightly divergent, rather sparsely punctate, deep blue, with pale pubescence; cheeks black with pale pubescence; eyes bare. Antennae black; first joint short; second joint very short; third joint long, thickened, especially at base, and somewhat curved, the upper surface distinctly concave, arista stout, rising near base, shorter than segment, a shallow groove on outer surface of third joint below arista; relative proportions of joints 4:2:16. Mesonotum black on disc, blue at sides, the black portion slightly iridescent, finely and rather sparsely punctate with some fine transverse striae; pubescence long, dark, with paler hairs intermingled, especially at sides. Scutellum deep blue, pubescence mainly pale, apical margin rounded, not dentate. Pleurae blue with pale pubescence. Abdomen deep blue, the first segment black, laevigate, the remainder rather closely and finely granulate, pubescence short, dark, appressed, longer pale hairs extending along the pubescence on mesopleuron extending on to humeral angles; pubescence elsewhere scanty, whitish. Abdomen dull blackish, closely granulate, pubescence mainly short and black, some longer white hairs present at base of second segment, as an indefinite oblique line on each side of fourth segment in apical half and on the lateral margins of the second to basal half of fourth segment; venter black. Legs black, femora feebly iridescent, knees narrowly brownish; moderately long and thin, the posterior metatarsi long but distinctly broadened; pubescence mainly white. Wings hyaline, veins brownish, venation normal. Calypters pale brown with blackish margins; halteres yellow.

Length, 6·5 mm.

Hab.—Brisbane (26.2.19, H. Hacker). A single female in the collection of the Queensland Museum. A lovely little species, quite distinct from other Australian species and readily recognized by the tufts of dense golden pubescence.

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Thorax, abdomen and legs as in *M. chalybeus*; wings with veins distinctly suffused with brown.

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♀. Differs from male mainly in the entire absence of pale pubescence; the third antennal joint is somewhat less thickened at base.

Length, 8 mm.

Hab.—Type (no locality); allotype, Brisbane (G. H. Hardy, August, 1925); paratypes 2 ♂, Brisbane (H. Hacker, 4.9.11, 24.9.23), ♂ Stradbroke Is. (J. W. Boreham, October, 1891), Tasmania (Simson 2711), ♀ Victoria, Warburton, 1.20 (F. P. Spry).

In the paratypes, M_1 is quite straight not sinuous, and it is possible that, if this is constant, the southern specimens should be separated from the northern; as in other respects they agree, it would be rash to separate them without further evidence.

In one wing of the Victorian specimen, R_5 extends completely across the underlying cell to join M_{1+2}.

The species is apparently close to *M. coeruleus* from India, but the scutellum is not dentate; judging from Brunetti's figure, the antennae must be very similar, but the first joint longer.

The species might conceivably be *M. pictipennis* Macq., but there are several discrepancies in the description, notably that the face in the female is not clothed "à petits poils blancs", and the first two joints of the antennae are not "testacés". It is unfortunate that the third joint was missing in Macquart's type.

MICRODON DIMORPHON, n. sp.

♂. Head black with faint bluish sheen in parts; front very broad, one and a half times as wide as an eye, ocellary region laevigate with some dark hairs, bounded by an oblique line on each side anteriorly; lateral portions of front depressed, slightly punctate, with long straw hairs, the median line subcarinate, laevigate; face broad, retreating towards mouth and sloping from middle towards eyes, with long pale-straw hairs. Antennae slightly longer than head, stout, black; first joint slender, subcylindrical; second very short, little wider than first, third very stout and concave on upper and outer surface, the arista, which is stout, arising at the base of this surface (6:2:12). Mesonotum black, iridescent, clothed with long, straw-coloured pubescence, rather denser at sides; scutellum black with faint bluish tinge, with punctures rather sparse, with erect straw-coloured pubescence, thicker along the free border, apex feebly sulcate; pleural segments black with long pale pubescence in anterior portion.

Abdomen not greatly constricted at base, the first segment black, short; second segment mainly blue-black with or without a reddish-brown apical border not extending across mid-line, widened from base to apex; third and fourth segments gradually but only slightly decreasing in width towards apex, reddish-brown with a central blue-black vitta, continuous with that colour on second segment, interrupted before apex of third segment and not extending beyond middle of fourth; pubescence long and pale on sides and along the apical margins of segments, but interrupted in mid-line, rest of dorsum with shorter dark appressed hairs. Venter reddish-brown with pale pubescence. Legs reddish-brown, the coxae, trochanters, basal third of femora, apical third lateral margins of the whole abdomen, and forming a small patch on each side of base of second segment. Venter blue. Legs light reddish-yellow, the coxae, trochanters and tarsi black, the latter with yellow pubescence beneath. Wings grey, slightly darker along veins, venation normal, M_1 and M_3 somewhat sinuous, stump of R_5 present. Calypters white; halteres yellow, brownish at base.

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Abdomen not greatly constricted at base, the first segment black, short; second segment mainly blue-black with or without a reddish-brown apical border not extending across mid-line, widened from base to apex; third and fourth segments gradually but only slightly decreasing in width towards apex, reddish-brown with a central blue-black vitta, continuous with that colour on second segment, interrupted before apex of third segment and not extending beyond middle of fourth; pubescence long and pale on sides and along the apical margins of segments, but interrupted in mid-line, rest of dorsum with shorter dark appressed hairs. Venter reddish-brown with pale pubescence. Legs reddish-brown, the coxae, trochanters, basal third of femora, apical third of tibiae and tarsi black; posterior metatarsi stout. Wings clear, pale grey, not suffused along veins; halteres yellow.

♀. Larger than male, entirely black except the legs; the thorax slightly iridescent; clothing mainly black, except on face, lower portions of pleura and abdominal segmentations; legs coloured as in male. Front as wide as in male; antennae similar, the third joint very slightly shorter.

Length, 7-10 mm.

Hab.—Western Australia: ♂ ♀ Mundaring, Armadale (J. Clark); ♀ South Australia (Macleay Museum). ♂ Queensland: Stanthorpe (F. A. Perkins, 26.9.22).

The sexes are so different in appearance that when only the Queensland male and the South Australian female were available they were thought to represent two different species. The receipt of a series from Mr. J. Clark from Western Australia clearly shows that they are the sexes of one species, and the puparia are also identical.

The Queensland male is rather brighter than the type and the blue colour of the second abdominal segment more obvious; other Western Australian males are as brightly coloured as the Queensland male. The punctures on the front are perhaps slightly longer in the Queensland specimen and the thoracic pubescence rather larger; the differences do not appear specific and are hardly definable. The type is apparently slightly dusty, but is otherwise in better condition than the other specimens; all the Western Australian females appear somewhat greasy.

The species approaches close to *M. chalybeus*, but the antennal proportions are somewhat different and the colour is also distinctive. The puparium is of the normal shape characteristic of the genus and is of a light testaceous colour; there are four rows of dark brown, feebly granulose obtuse tubercles, one along each side of the dorsum composed of six tubercles and one above each lateral margin composed of seven tubercles.

The posterior spiracles are dark brown at base, light brown and laevigate at apex, which is feebly bifid.

Specimens have been reared by Mr. Clark from pupae found in the nests of *Iridomyrmex rufoniger*, *I. gracilis* and *I. discors*. Two specimens were taken in a nest of *I. rufoniger* in a termitarium of *Eutermes* sp. An unhatched puparium taken by Mr. Davey in Victoria in a nest of *Iridomyrmex nitidiceps* apparently belongs to the same species.

Concerning this species Mr. Clark writes: "I spent a whole afternoon watching females depositing their eggs. They are, or appear to be, the most clumsy insects I know; they seem to be too lazy to fly more than a few feet, then tumble to the ground. The ants take no notice of them".

MICRODON NIGROMARGINALIS C. & B.

Microdon nigromarginalis Curran and Bryan, 1926, p. 132.

The description of this species agrees well with a fairly common and widely distributed species that has hitherto been confused in collections with *M. brachycerus* under the name *M. pictipennis**.

Only the female was known to Curran and Bryan; in the male the front is strongly constricted about midway between the ocelli and antennae with a shallow groove at narrowest part. Also the light pubescence on the thorax is golden instead of silvery, as in the female. This species has recently been of tibiae and tarsi black; posterior metatarsi stout. Wings clear, pale grey, not suffused along veins; halteres yellow.

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* The identification has been confirmed by the receipt of a paratype from Mr. Bryan.

♀. Larger than male, entirely black except the legs; the thorax slightly iridescent; clothing mainly black, except on face, lower portions of pleura and abdominal segmentations; legs coloured as in male. Front as wide as in male; antennae similar, the third joint very slightly shorter.

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Only the female was known to Curran and Bryan; in the male the front is strongly constricted about midway between the ocelli and antennae with a shallow groove at narrowest part. Also the light pubescence on the thorax is golden instead of silvery, as in the female. This species has recently been bred by Mr. Bertram from pupae obtained from cavities in a fallen log where they were living in association with ants. The puparium is of the usual shape, elongate-elliptical, convex with flattened ventral surface; light brown and covered with small granules, somewhat obscurely arranged in clusters and in a somewhat longitudinal direction; the margins are fimbriated; the posterior spiracle is coloured as the dorsum, longitudinally corrugated with a feebly bifid apex on each side of which are situated the shining reddish-brown spiracles; the anterior respiratory horns are black and set with small spinose denticles.

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* The identification has been confirmed by the receipt of a paratype from Mr. Bryan.

Length 7 mm., width 4·5 mm., height about 2·5 mm.

Hab.—New South Wales: Kosciusko, Sydney, Blue Mountains; Queensland: Brisbane, Pt. Curtis, Rockhampton, Eungella (Mackay).

MICRODON MODESTUS, n. sp.

A small obscure species allied to *M. vittatus.*

♂. Head black, front narrowed in front of middle, thence widened to face. width at vertex one-fourth total head-width, at narrowest part about one-tenth head-width, black with bronzy reflections, pubescence dark, some pale pubescence on orbits on each side of antennae; face convex, parallel-sided, somewhat broader than front at its widest part, black with bronzy reflections in centre, greenish-bronze at sides, pubescence rather dense, pale; posterior orbits with scanty pale hairs. Antennae black, first joint short, second about half length of first, third briefly elongate, ovate, equal in length to other two joints, apex obtuse, arista arising from outer and upper surface near base, an obscure longitudinal groove on outer surface below arista; relative proportions approximately 3·5:1·5:5. Mesonotum black with greenish-bronze reflections, except humeral angles and postero-lateral ridge which are black with faint blue sheen; finely and rather sparsely punctate; pubescence rather short, pale. Scutellum similar to mesonotum, green-bronze, with fine punctures, and rather fine pale pubescence, apex rather strongly sulcate, but not dentate. Pleurae black with greenish iridescence; pubescence pale, scanty. Abdomen blackish-brown, second to fourth segments with pale straw-coloured pubescence, that on second forming a wide band at sides, very narrow along apical margin, that on third broader at sides, but hardly interrupted in mid-line, that on fourth covering most of surface except on a broad basal band. Venter brown with pale pubescence. Legs brown, femora black at base, the black more extensive on the intermediate and posterior femora, being continued along dorsal surface nearly to knees; tibiae slightly infuscated about apical third, tarsi also somewhat darker, especially the posterior. Wings grey, veins brown, hardly suffused; venation normal. Calypters and halteres yellowish.

Length, 5 mm.

Hab.—Queensland: Brisbane (25.9.19, H. Hacker).

♀. Similar to male, front two-sevenths of head-width at vertex, sides divergent anteriorly, with more extensive straw-coloured pubescence in front; face slightly narrower than front and slightly narrowed to oral margin. Antennae slightly longer, relative lengths of joints 4:2:8. Thorax similar. Abdomen somewhat lighter brown, fourth segment with complete apical band of pale pubescence; fifth segment with apical patch of pale pubescence. Legs lighter brown, the black area on femora less marked and the tibiae and tarsi hardly infuscated.

Length, 8 mm.

Hab.—New South Wales: Hunter River, Yass (Macleay Museum).

A small obscure species related to *M. vittatus* but differentiated by the dark scutellum with grooved apex, and by the arrangement of the abdominal pubescence.

bred by Mr. Bertram from pupae obtained from cavities in a fallen log where they were living in association with ants. The puparium is of the usual shape, elongate-elliptical, convex with flattened ventral surface; light brown and covered with small granules, somewhat obscurely arranged in clusters and in a somewhat longitudinal direction; the margins are fimbriated; the posterior spiracle is coloured as the dorsum, longitudinally corrugated with a feebly bifid apex on each side of which are situated the shining reddish-brown spiracles; the anterior respiratory horns are black and set with small spinose denticles.

Length 7 mm., width 4·5 mm., height about 2·5 mm.

Hab.—New South Wales: Kosciusko, Sydney, Blue Mountains; Queensland: Brisbane, Pt. Curtis, Rockhampton, Eungella (Mackay).

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Length, 8 mm.

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A small obscure species related to *M. vittatus* but differentiated by the dark scutellum with grooved apex, and by the arrangement of the abdominal pubescence.

There is also some difference in the antennal proportions, but the structure is similar in the two species.

I believe that the above ♂ and ♀ are correctly placed as sexes of but one species, though the localities from which they come are rather far apart, and though there are differences, these are probably of a sexual nature. In general appearance the species resembles *M. nigromarginalis* but lacks the upturned fringe of black hair on the free border of the scutellum.

A specimen (♂) of this species has recently been received from Perth, W.A. (J. Clark).

MICRODON VITTATUS (Macq.).

Aphritis vittatus Macq., 1850, p. 129.—*Eumerus transiens* Walk., 1852, p. 225.—*Microdon vittatus* Hardy, 1921, p. 15.

Hardy places *Microdon brachycerus* Knab and Malloch as a synonym of this species, but this is certainly incorrect.

Specimens corresponding with Macquart's and Walker's descriptions are before me from Tasmania, Victoria and New South Wales. The species should be readily recognized from most other Australian species by the combination of short antennae, nonmetallic colour and unarmed scutellum. *M. nigromarginalis* C. & B. is closely allied, but differs *inter alia* in the dense black apical pubescence on the scutellum. The following species is more closely related but is, I think, distinct; the differences are discussed under *M. barringtonensis*.

The first antennal joint is nearly the length of the third; Hardy (1921) gives the relative lengths of the three joints as 0·5 mm., 0·2 mm., 0·5 mm. The short series before me show the following proportions in different specimens: Zeehan, Tasmania, ♂ 5:3:6; Barrington Tops, N.S.W., ♂ 5:2½:7 (3 specimens), ♀ 5:2½:8; Fern Tree Gully, Victoria, ♀ 5:3:8; Gippsland, Victoria, ♂ 5:3:8; small ♂, no location, National Museum, 4:2:6.

The Barrington Tops specimens are somewhat smaller than the Tasmanian and Victorian specimens, but do not appear to differ in other details.

The wing venation differs from that of *M. barringtonensis* in that the apical portions of M_{1+2} and M_{3+4} are much less sinuate but more strongly recurved and show fewer rudimentary veinlets.

Hab.—Tasmania, Victoria, New South Wales.

MICRODON BARRINGTONENSIS, n. sp.

A medium-sized brownish species, closely allied to *M. vittatus* Macq., but with different antennal proportions.

♂. Head black; front narrowed in front of ocelli, sides thence slightly divergent, a shallow depression across narrowest part, black, obscurely ferruginous across middle and at sides, rather sparsely punctate, with black hairs intermingled with golden in front and on vertex; face gently convex, black, becoming ferruginous towards sides, rather densely clothed with golden pubescence; cheeks black. Antennae with first two joints ferruginous, densely black-haired, third joint black, all the joints short, the third slightly longer than the first and ovate, arista longer than third joint; relative proportions of joints 7:3:9. Mesonotum black on disc, iridescent, humeral angles and sides before suture yellowish-brown, sides and posterolateral angles darker brown, more ferruginous; pubescence mainly golden, but dark hairs present in places, more particularly behind suture. Scutellum dark ferruginous, laevigate, sparsely punctate, with dark pubescence above, and golden hairs along face border; apex rounded, not

There is also some difference in the antennal proportions, but the structure is similar in the two species.

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The wing venation differs from that of *M. barringtonensis* in that the apical portions of M_{1+2} and M_{3+4} are much less sinuate but more strongly recurved and show fewer rudimentary veinlets.

Hab.—Tasmania, Victoria, New South Wales.

MICRODON BARRINGTONENSIS, n. sp.

A medium-sized brownish species, closely allied to *M. vittatus* Macq., but with different antennal proportions.

♂. Head black; front narrowed in front of ocelli, sides thence slightly divergent, a shallow depression across narrowest part, black, obscurely ferruginous across middle and at sides, rather sparsely punctate, with black hairs intermingled with golden in front and on vertex; face gently convex, black, becoming ferruginous towards sides, rather densely clothed with golden pubescence; cheeks black. Antennae with first two joints ferruginous, densely black-haired, third joint black, all the joints short, the third slightly longer than the first and ovate, arista longer than third joint; relative proportions of joints 7:3:9. Mesonotum black on disc, iridescent, humeral angles and sides before suture yellowish-brown, sides and posterolateral angles darker brown, more ferruginous; pubescence mainly golden, but dark hairs present in places, more particularly behind suture. Scutellum dark ferruginous, laevigate, sparsely punctate, with dark pubescence above, and golden hairs along face border; apex rounded, not dentate. Pleurae yellow-brown; pubescence golden, black on mesopleuron. Abdomen ferruginous with an obscure darker median vitta mainly with appressed dark pubescence, but with areas of pale yellow pubescence over greater part of second segment, as a triangular patch on each side of middle line at apex of third and fourth segments and along lateral margin of third segment. Venter ferruginous with rather sparse pale pubescence. Legs reddish-brown or ferruginous with ill-defined blackish patch on middle third of femora, a transverse somewhat oblique scar crossing femora at basal third, a similar scar present at apical third of tibiae; pubescence mainly dark, pale on coxae and basal third of femora, bright orange on under surface of tarsi.

Wings clear, faintly greyish, the veins lightly suffused with dark grey; venation as in genus, but apical sections of M_{1+2} and M_{3+4} strongly sinuate with well marked projecting rudiments of veinlets. Calypters and halteres yellow.

Female agrees with male, but forehead wider and hardly contracted in front of ocelli, there being no sulcus across middle.

Length, ♂, ♀ 10 mm. (Approximately, as the abdomen is bent under in both sexes.)

Hab.—New South Wales: Barrington Tops, February 25 (Sydney University Zoological Expedition), 2 ♂, 1 ♀.

Type in Macleay Museum.

This species, though unquestionably close to *M. vittatus*, appears to be distinct. The main differences are the larger size, reddish-brown basal antennal joints, different relative proportions of joints, the more lightly pictured wings, the somewhat different venation. In *M. vittatus* the pale abdominal pubescence appears somewhat more extensive, though in both species this is hard to define and is only visible from certain directions. The antennal proportions are identical in the three specimens under examination.

MICRODON PICTIPENNIS (Macq.).

Aphritis pictipennis Macquart, 1850, p. 129, Pl. 12, fig. 12.

The identity of Macquart's species is unfortunately uncertain. Hardy (1921, p. 15) identified as this species, one that is evidently *M. brachycerus* Knab and Malloch, and which does not agree with Macquart's description. These latter authors state that the species appears to be related to *M. pictipennis*, but on account of the differences regard the species as distinct.

Macquart described the female and added a description of a specimen which he regarded evidently with some doubt as the male. The descriptions of the two sexes appear so different that I have no doubt that they represent two distinct species. That of the male is certainly much closer to *M. brachycerus* than the description of the female. As Knab and Malloch point out, there is nothing to indicate which sex was figured by Macquart.

The description of the female indicates a blue species similar to *M. nicholsoni* or *M. chalybeus*; there are, however, differences between the description and each of these species and it would be rash to affirm the identity of either with Macquart's type. Unfortunately the third joint of the antennae was missing when described, but the two basal joints being testaceous, at least suggests that Macquart's species was different from either species.

Hab.—Tasmania: This locality even must be viewed with doubt, as many species described as from Tasmania in this portion of Macquart's work are now known to be from the mainland.

dentate. Pleurae yellow-brown; pubescence golden, black on mesopleuron. Abdomen ferruginous with an obscure darker median vitta mainly with appressed dark pubescence, but with areas of pale yellow pubescence over greater part of second segment, as a triangular patch on each side of middle line at apex of third and fourth segments and along lateral margin of third segment. Venter ferruginous with rather sparse pale pubescence. Legs reddish-brown or ferruginous with ill-defined blackish patch on middle third of femora, a transverse somewhat oblique scar crossing femora at basal third, a similar scar present at apical third of tibiae; pubescence mainly dark, pale on coxae and basal third of femora, bright orange on under surface of tarsi.

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Addendum (30th April, 1926).—The following species, which has lately been received, is of some importance as showing a further link between *M. variegatus* Walk. and the rest of the genus. When first examined it was considered a somewhat aberrant form of *M. variegatus*, but an examination of the puparium shows very distinct differences.

MICRODON PRAETERMISSUS, n. sp.

Allied to *M. variegatus* Walker but abdomen not constricted at base and puparium not reticulate. Head black, front broad, minutely granulate, except in mid line, mostly clothed with short black hairs, but some golden pubescence present on each side anteriorly and at vertex; face broader than front, somewhat flattened, retreating to oral margin, clothed with creamy pubescence, somewhat irregularly arranged. Antennae elongate, first joint blackish, cylindrical; second dark brown, very short; third brown, elongate spindle shaped, obtusely pointed, with a longitudinal sulcus along under surface, the arista appearing to arise also from the underside, in reality probably the outer side of the joint, relative length of joints 11:2:19.

Thorax black, minutely granulate, with a narrow transverse band of golden hairs across thorax at level of transverse suture, and continued down pleura as a creamy band; a few golden hairs on posterolateral angles. Scutellum black, with some golden hairs at base, apex rounded, not dentate.

Abdomen elongate, not constricted at second segment, the following segments but little widened, dark brown almost black, the second segment largely yellow, and extreme base of third yellow, the apicolateral angles of third and fourth segments and the apex of fifth yellowish-brown, pubescence dark, a patch of golden pubescence on each posterolateral angle of the third and fourth segments. Legs reddish-yellow, the coxae, trochanters and basal third of femora black. Wings rather heavily suffused along the veins.

Length, 8 mm.

Hab.—South Australia: Mt. Lofty (A. M. Lea). Type in South Australian Museum.

Described from a single somewhat damaged female, gummed to a card on which are also gummed an empty puparium and an unhatched larva.

The puparium (6 × 3·5 mm.) is of the usual shape, elliptical-ovate, flattened beneath, yellow-brown in colour; the dorsal longitudinal furrow is hardly indicated and the surface is not reticulate but dotted with numerous very small white granules resembling grains of sand; the posterior spiracular horn is broken off the empty puparium, but on the larva the horn is reddish-brown, slightly rugose, with the apex not bifid. The larva closely resembles the pupa except that the anterior horns are absent.

With the wings folded in repose it is very difficult to distinguish this species from *M. variegatus* except by the somewhat shorter antenna, though specimens of *M. variegatus* occur with unusually short third joint, the shape of this joint is somewhat different.

The specimen was received after the key was in print and could not be included. As the key now stands it would run to the section containing *M. modestus* from which it would be separated by the scutellum being dark but not sulcate. The species is, however, much more closely allied to *M. variegatus* and the key will require modification in the beginning. I am unwilling to alter it now as it is highly probable that other species await discovery and a new key to the genus will be required.

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EXPLANATION OF PLATE XIV.

Fig. 1. *Microdon alcicornis*, n. sp. Head (one antenna only is shown).

Fig. 2. *Microdon variegatus* Walk. Dorsal view.

Fig. 3. *M. variegatus* Walk. Larvae and pupae.

Figs. 4-7. *M. variegatus* Walk. Lateral view showing wasp-like attitudes assumed in walking.

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